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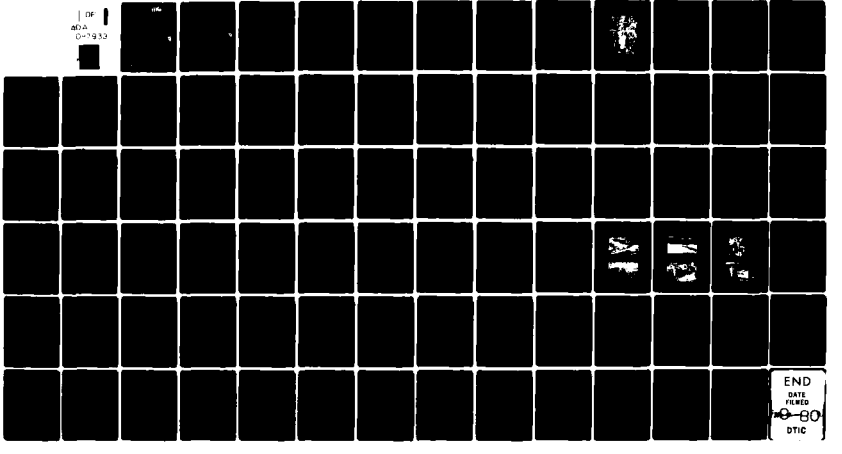

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LEVEL II

DELAWARE RIVER BASIN
LEAVITT BRANCH OF BRODHEAD CREEK, MONROE COUNTY

PENNSYLVANIA

LAKE JAMIE DAM

NDI ID NO. PA-00778
DER ID NO. 45-220

JAMES A. BALLIET

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JUNE 1980

GANNETT FLEMING CORDDRY AND CARPENTER, INC
DACW31-80-C-0017

DELAWARE RIVER BASIN

LEAVITT BRANCH OF BRODHEAD CREEK, MONROE COUNTY

PENNSYLVANIA

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LAKE JAMIE DAM

NDI ID No. PA-00778
DER ID No. 45-220

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JAMES A. BALLIET

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM. Lake Jamie Dam (NDI ID Number PA-00778, DER ID Number 45-220), Delaware River Basin, Leavitt Branch of Brodhead Creek, Monroe County, Pennsylvania, Phase I Inspection Report

Prepared by

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
P.O. Box 1963
Harrisburg, Pennsylvania 17105

For

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JUNE 1980

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

DELAWARE RIVER BASIN

LEAVITT BRANCH OF BRODHEAD CREEK, MONROE COUNTY

PENNSYLVANIA

LAKE JAMIE DAM

NDI ID No. PA-00778
DER ID No. 45-220

JAMES A. BALLIET

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

JUNE 1980

CONTENTS

APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Lake Jamie Dam NDI ID No. PA-00778 DER ID No. 45-220
Size:	Small (12 feet high; 276 acre-ft)
Hazard Classification:	High
Owner:	James A. Balliet 225 South 4th Street Coplay, PA 18037
State Located:	Pennsylvania
County Located:	Monroe
Stream:	Leavitt Branch of Brodhead Creek
Date of Inspection:	14 April 1980

Based on available records, visual inspection, calculations, and past operational performance, Lake Jamie Dam is judged to be in fair condition. The recommended Spillway Design Flood (SDF) for the size and hazard classification of the dam varies between the 1/2 Probable Maximum Flood (PMF) and the PMF. Based on the criteria and the downstream conditions, the selected SDF at the dam is the PMF. Based on existing conditions, the spillways will pass about 46 percent of the PMF before overtopping of the dam occurs. However, it is judged that the dam could just withstand the depth and duration of overtopping that would occur for the 1/2 PMF. If the low areas on the

top of the embankment were filled to the design elevation, the spillways would pass about 77 percent of the PMF. For either condition, the spillway capacity is rated as inadequate, but not seriously inadequate.

The steep downstream slope and the seepage at the dam indicate that the embankment stability may be marginal for the normal operating condition. The main spillway weir is judged to be stable.

The ability of the emergency drawdown facility to function is uncertain.

The dam has significant deviations from the design data.

Maintenance at the dam needs to be improved.

The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Perform studies to determine the factor of safety for the embankment and to determine the potential of the seepage to cause piping (internal erosion). Take appropriate action as necessary. In lieu of the above, constructing the downstream slope to its design value and providing a properly designed toe drain to control seepage would be acceptable.

(2) Perform additional studies to more accurately ascertain the spillway capacity required for Lake Jamie Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take appropriate action as required. In lieu of the above, filling in the low areas along the top of the dam to bring the embankment to its design elevation would be acceptable.

(3) Repair the spillway training wall so that it acts as an impervious barrier and repair the eroded areas behind the wall.

(4) Perform studies to determine the cause of the tilting of the intake structure. Take appropriate action as necessary.

(5) Institute any necessary action to make the outlet works gate operational. Maintain and operate it on a regular basis.

(6) Repair the cracks in the spillway walls. Visually monitor the cracks. If the cracks enlarge or if other cracks appear, have the condition assessed by a professional engineer.

(7) As part of the regular maintenance program, complete cutting brush on the embankment, remove debris from the main spillway approach channel, and establish a grass cover on the eroded foot trail.

All studies and designs, as well as inspection of construction, should be performed by a professional engineer experienced in the design and construction of dams.

In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Lake Jamie Dam.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Lake Jamie Dam.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the dam is inspected frequently. As presently required by the Commonwealth, the program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the results to determine if remedial measures are necessary.

(5) Expand the existing maintenance program so that all features of the dam are properly maintained.

LAKE JAMIE DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 27 June 1980

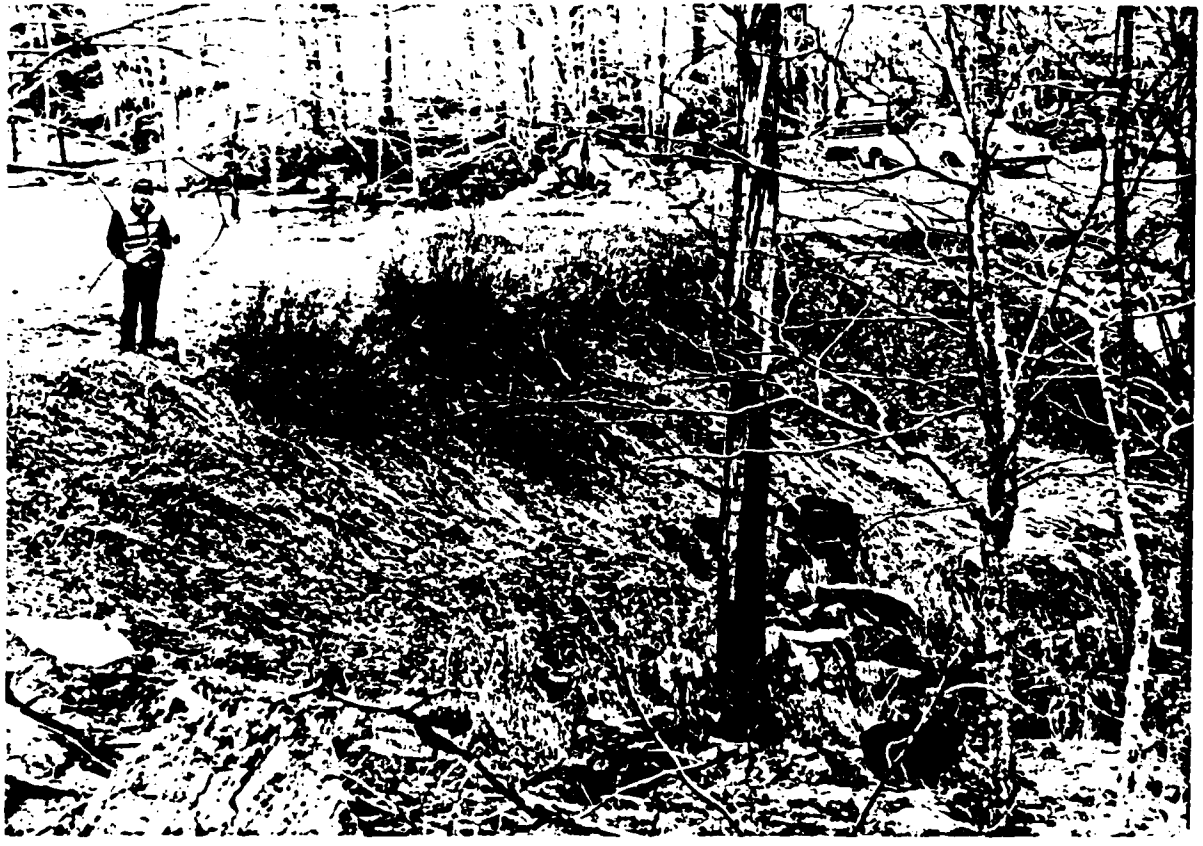
Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 14 July 1980

LAKE JAMIE DAM



Overview

DELAWARE RIVER BASIN

LEAVITT BRANCH OF BRODHEAD CREEK, MONROE COUNTY

PENNSYLVANIA

LAKE JAMIE DAM

NDI ID No. PA-00778
DER ID No. 45-220

JAMES A. BALLIET

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

JUNE 1980

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lake Jamie Dam is a homogeneous earthfill embankment with a concrete cutoff wall. The embankment is 172 feet long, including the spillway, and 12 feet high. The cutoff wall is founded in a trench cut into bedrock. The top of the wall is about 1 foot above the top of the natural overburden that existed at the site.

The spillway is located near the left abutment. It is a broad-crested concrete gravity weir with a rounded crest. The crest is 29.6 feet long and 3 feet below the top of the dam.

The outlet works is located near the middle of the embankment to the right of the spillway. It consists of a concrete intake structure with a 24-inch sluice gate, a 24-inch diameter corrugated metal pipe (CMP) encased in concrete, and an endwall.

The auxiliary spillway is located at the upper end of the reservoir. It is a natural low area that discharges into Spruce Mountain Run. The various features of the dam are shown on the Photographs in Appendix C and on the Plates in Appendix E. A description of the geology is included in Appendix F.

b. Location. Lake Jamie Dam is located on the Leavitt Branch of Brodhead Creek in Barrett Township, Monroe County, Pennsylvania, approximately 4 miles north of Canadensis. Lake Jamie Dam is shown on USGS Quadrangle, Buck Hill Falls, Pennsylvania, at latitude N 41° 14' 35" and longitude W 75° 16' 05". A location map is shown on Plate E-1.

c. Size Classification. Small (12 feet high, 276 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Lake Jamie Dam (Paragraphs 3.1e and 5.1c(5)).

e. Ownership. James A. Balliet, 225 South 4th Street, Coplay, PA 18037.

f. Purpose of Dam. Recreation.

g. Design and Construction History. Lake Jamie Dam was designed in 1954. Specifics concerning the design are discussed in Section 2. Construction was due to start in the late summer of 1955, when Tropical Storm Diane occurred. The Owner believed the contractor was called "Mountain Airy." The contractor, who had just mobilized at the damsite, was required elsewhere for emergency cleanup operations. The Owner requested a delay, which was approved

by the Commonwealth. The contractor did not continue construction until the late summer of 1956. The dam was completed in December 1956. The Commonwealth approved the completed project in the same month.

The Owner stated that, "a few" years after the dam was completed, spillway flow had eroded the embankment at the junction with the downstream right spillway wall. The Owner constructed a stone masonry training wall at the area to prevent further erosion.

h. Normal Operational Procedure. The pool is maintained at the main spillway crest level with excess inflow discharging over the spillways. The emergency drawdown facilities are not used. Main spillway discharge flows downstream in the Leavitt Branch. Auxiliary spillway discharge flows downstream in Spruce Mountain Run.

1.3 Pertinent Data

a.	Drainage Area. (square miles)	0.8
b.	Discharge at Damsite. (cfs.)	
	Maximum known flood at damsite	Unknown
	Outlet works at maximum pool elevation	40
	Spillway capacity (combined-main and auxiliary) at maximum pool elevation	
	Design conditions	1,237
	Existing conditions	683
c.	Elevation. (feet above msl.)	
	Top of dam	
	Design conditions	1869.0
	Existing conditions	1868.0
	Maximum pool	
	Design conditions	1869.0
	Existing conditions	1868.0
	Normal pool (main spillway crest)	1865.0
	Upstream invert outlet works	1857.0
	Downstream invert outlet works	1856.2
	Streambed at toe of dam	1856.1
d.	Reservoir Length. (miles)	
	Normal pool	0.53
	Maximum pool (design)	0.55

e.	Storage. (acre-feet)	
	Normal pool	131
	Maximum pool (design)	330
	Maximum pool (existing)	276
f.	Reservoir Surface. (acres)	
	Normal pool	44
	Maximum pool (design)	55
g.	Dam.	
	Type	Earthfill with concrete cutoff wall.
	Length (feet - including spillway)	
	Design	146
	Existing	172
	Height (feet)	
	Design	13
	Existing	12
	Topwidth (feet)	
	Design	18
	Existing	20
	Sides Slopes	
	Upstream	
	Design	1V on 2H
	Existing	1V on 2.5H
	Downstream	
	Design	1V on 2H
	Existing	1V on 1.6H
	Zoning	Homogeneous earthfill with cutoff wall.
	Cut-off	Cutoff wall founded in cutoff trench.
	Grout Curtain	None.

h.	Diversion and Regulating Tunnel.	None.
i.	Spillway.	
	Type	
	Main	Broad-crested concrete gravity weir with rounded crest.
	Auxiliary	Natural low area.
	Length of Weir (feet)	
	Main	
	Design	30.0
	Existing	29.6
	Auxiliary (approximate)	3.0
	Crest Elevation	
	Main	1865.0
	Auxiliary	1865.7
	Upstream Channel	
	Main	Reservoir.
	Auxiliary	Short length of natural ground on adverse slope.
	Downstream Channel	
	Main	Concrete apron.
	Auxiliary	Natural stream.
j.	Regulating Outlets.	
	Type	One 24-inch dia. CMP encased in concrete.
	Length (feet)	55
	Closure	Sluice gate in intake structure.
	Access	By boat to intake structure.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. Except for the design drawing (Plate E-2), no design data are available for review. The Owner described the design as "borrowing" the plans for the recently constructed Lake-In-The-Clouds Dam, which is 0.7 mile downstream. Apparently the Lake-In-The-Clouds drawings were adapted to the Lake Jamie Dam site conditions. The Owner could not give additional information concerning Wm. H. Pedrick, who signed the design drawing, other than that he was now deceased.

The Commonwealth reviewed the design before issuing a permit for its construction; they had no comments concerning the design. Because of inaccuracies in available USGS mapping, they believed that the dam was on Spruce Mountain Run and that its failure would not present any hazard to human life or property.

b. Design Features. The project is described in Paragraph 1.2a. The various features of the dam are shown on the Photographs in Appendix C and on the Plates in Appendix E.

c. Design Considerations. Because dam design is site dependent, it is not good practice to adapt a dam design from another site without a thorough review of the site conditions.

2.2 Construction.

a. Data Available. The data available is limited to construction progress reports signed by the Owner and submitted to the Commonwealth. When interviewed by the inspection team, the Owner did not recollect any particular problems during the construction of the dam.

b. Construction Considerations. The construction is assessed in Section 6.

2.3 Operation. There are no formal records of operation. There has been only one previous formal inspection; it was performed by the Commonwealth and it notes no conditions of concern.

2.4 Evaluation.

a. Availability. Engineering data was provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER). The Owner made himself available for information during the visual inspection.

b. Adequacy. The type and amount of available design data and other engineering data are limited, and the assessment must be based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. As discussed in Sections 5 and 6, some of the data shown on Plate E-2 are obviously in error. Other than this, there is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall appearance of the dam is fair. Deficiencies were observed as noted below. A sketch of the dam with the locations of deficiencies is presented on Exhibit B-1 in Appendix B. Survey information acquired for this Report is summarized in Appendix B. Datum for the survey was taken at the main spillway crest, Elevation 1865.0, as shown on USGS mapping. The Owner uses a different datum. To convert the elevations on the Plate E-2 in Appendix E, 857.0 feet must be added to the elevations on those Plates. On the day of the inspection, the pool was 0.1 foot above the main spillway crest level.

b. Embankment. The embankment is in fair condition. The upstream slope is protected by riprap, which is in good condition. Above normal pool elevation, the riprap is covered with grass (Photograph B). The top of the dam is covered with grass. The downstream slope is covered with grass and thick brush (Photograph A). A foot trail on the downstream slope just to the left of the outlet works is eroded. The erosion is very shallow. At the junction of the embankment and the right spillway wall, behind the stone masonry training wall, the downstream embankment slope is eroded severely (Photograph D). The erosion extends about half-way up the slope.

Clear seepage was observed at the downstream toe of the embankment. As shown on Exhibit B-1, the seepage areas are localized. The largest single seepage area was flowing at about 10 gpm with significant force. Some water is also leaking through the spillway training wall. Exclusive of the leaks through the spillway training wall, the total seepage was estimated at 28 gpm. The Owner was of the opinion that almost all the seepage was emanating from the leaks in the spillway training wall.

The survey performed for this inspection reveals that the top of the embankment is low along the entire length and that the embankment is 26 feet longer than the design drawing indicates. The lowest area on the top is 1.0 foot below its design elevation. The profile is shown in Appendix B. The survey also reveals that the topwidth is slightly greater and the upstream slope is slightly

flatter than their design values. The downstream slope is significantly steeper than its design value. A typical section is shown in Appendix B.

When the inspection team returned on the second day of the inspection, the Owner was cutting the brush on the downstream slope. About 50 percent of the brush had been removed.

c. Appurtenant Structures. The spillway is in fair condition. A massive log, larger than a telephone pole and about the length of the weir, was floating in the approach channel just upstream of the weir (Photograph C). The weir itself is in good condition but the length of its crest measures 0.4 foot less than the design drawings indicate. The spillway sidewalls are slightly bowed. Cracks about 1/8-inch wide extend vertically through the walls just downstream of the weir (Photograph C). The spillway apron is in good condition. There is evidence of concrete patching on the apron and on the lower part of the cracks in the sidewalls. The patching appears to be rough but effective. The stone masonry training wall, which was added downstream of the right spillway wall after the dam was constructed, is in poor condition. The mortar is very deteriorated and daylight is visible through much of the wall. With the flow conditions on the day of the inspection, a significant amount of water was flowing through the wall. The erosion behind the wall, which reportedly occurred shortly after the dam was constructed, has never been repaired (Photograph D).

The outlet works is in fair condition. Minor spalling was observed on the endwall and intake structure (Photographs E and F). The intake structure tilts toward the dam (Photograph F). The gate operating mechanism on the intake structure is rusty. The Owner stated that it has not been operated since the dam was constructed; he reported that he had been instructed shortly after the dam was built by a representative of the Commonwealth to never operate the gate. He felt that the intake structure was partially silted, which would hinder the gate operation. Therefore, he declined to attempt to operate it for the inspection team.

The auxiliary spillway, which is at the upstream end of reservoir, is a natural low area that discharges into Spruce Mountain Run. The area is wooded, although there is presently no growth that would significantly hinder flow through the area. The area is sketched in

Appendix B. The Owner was unaware of the existence of the auxiliary spillway.

d. Reservoir Area. The watershed area is mostly wooded, with only an insignificant amount of rural development around the lake. At the reservoir, the slopes are fairly steep and wooded. There are some rock outcrops in the reservoir area. Many tree stumps protrude up in the reservoir.

e. Downstream Channel. At the damsite, the downstream channel is unobstructed. About 200 feet downstream from the dam are the remains of a dry masonry dam. The remains do not significantly encroach on the channel. From Lake Jamie, the stream extends for 0.1 mile through a steep and narrow valley to a small (10 acre) natural pond. The pond outlets into Lake-In-The-Clouds, which is 400 feet downstream of the pond. There are no dwellings or other structures adjacent to the stream between Lake Jamie Dam and Lake-In-The-Clouds.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at the main spillway crest, with excess inflow discharging over the spillways. The emergency drawdown facilities are not used.

4.2 Maintenance of Dam. The Owner stated that the dam is visited on an irregular basis by various residents in the development, who would report deficiencies to the Owner. No formal inspections are made. Maintenance of the dam is performed on an as-needed basis.

4.3 Maintenance of Operating Facilities. As explained in Section 3, the operating facilities are not maintained.

4.4 Warning Systems in Effect. The Owner stated that there is no emergency operation and warning system.

4.5 Evaluation of Operational Adequacy. The maintenance of the dam is fair. The maintenance of the operating facilities is inadequate. Regular inspections are necessary to detect hazardous conditions at the dam. An emergency operation and warning system is necessary to reduce the risk of dam failure should adverse conditions develop and to prevent loss of life should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. No design data are available for the hydraulics. The Commonwealth reviewed the hydraulics before issuing a permit to construct the dam. They analyzed the spillway using a discharge coefficient of 3.7; this appears to be slightly high. A coefficient of 3.4 is used for the main spillway in the analysis described hereafter. The discharge capacity of the auxiliary spillway, the existence of which was not known during the Commonwealth's review, is included in the analysis described hereafter.

The drainage area of 0.8 square mile that is used in this Report was based on recent USGS mapping. The drainage area of record is 0.6 square mile; it was based on older, larger scale USGS mapping. The older mapping was sufficiently inaccurate that the original permit was issued for a dam on Spruce Mountain Run. Even with the newer mapping, discrepancies between the mapping and some field observations were noted.

The plan of the reservoir shown on Plate E-2 is obviously in error because it does not show the arm of the lake that extends to the auxiliary spillway; the arm is shown on Plate E-1.

b. Experience Data. The Owner stated that the highest pool level in his recollection was 0.5 to 0.8 foot above the main spillway crest. The variation in pool is too large to determine an accurate discharge. The Owner also stated that the flood of record was almost certainly Tropical Storm Diane in 1955, before the dam was constructed. There is no data to estimate the flow for that storm.

c. Visual Observations.

(1) General. The visual inspection of Lake Jamie Dam, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The low areas on the top of the embankment limit the existing spillway capacity to less than the design capacity.

(3) Appurtenant Structures. The log in the main spillway approach channel could partially block the main spillway. This would reduce its discharge capacity.

Conditions at the auxiliary spillway are satisfactory at present. Maintaining the area would ensure that its discharge capacity would not decrease.

The sluice gate at the outlet works intake structure provides upstream closure. Because it has not been operated since the dam was completed, its functioning is, at best, uncertain.

(4) Reservoir Area. The many tree stumps in the reservoir will eventually rot and create debris at the spillway. As noted above, this may reduce its discharge capacity. The development in the watershed is negligible.

(5) Downstream Conditions. No conditions were observed downstream from the dam that would reduce the spillway discharge capacity. Sudden failure of Lake Jamie Dam would cause the overtopping of Lake-In-The-Clouds Dam, which is 0.7 mile downstream.

A Phase I Inspection Report is concurrently being prepared for Lake-In-The-Clouds Dam, which is a small size, high hazard dam with a seriously inadequate spillway capacity. Because the failure of Lake Jamie Dam could cause the failure of Lake-In-The-Clouds Dam, a high hazard classification is warranted for Lake Jamie Dam.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (Small) and hazard potential (High) of Lake Jamie Dam is between one-half of the Probable Maximum Flood (PMF) and the PMF. Because the SDF for Lake-In-The-Clouds Dam is the PMF, the PMF is selected as the SDF for Lake Jamie Dam. The watershed was modeled with the HEC-1DB computer program. A description of the model is included in Appendix D. The assessment of hydrology and hydraulics is

based on existing conditions, and the effects of future development are not considered.

(2) Summary of Results. Pertinent results are tabulated at the end of Appendix D. The analysis reveals that Lake Jamie Dam can pass about 46 percent of the PMF before overtopping of the dam occurs. During the 1/2 PMF, the dam would be overtopped for 1.75 hours to a maximum depth of 0.15 foot. The dam is rated at its existing top elevation. At its design top elevation, the dam could pass about 77 percent of the PMF.

(3) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix D. The overtopping by .15 foot during the 1/2 PMF would not cause erosive velocities. Since the dam would not fail, the spillway capacity of Lake Jamie Dam is rated as inadequate, but not seriously inadequate. If the top of the embankment were raised to its design elevation, the spillway capacity would still be rated as inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Lake Jamie Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. The growth of the brush on the downstream slope is a minor hazard at present. It was being removed on the second day of the inspection. Root systems of large size brush can loosen embankment material, displace slope protection, and create paths along which seepage and piping (internal erosion) might occur.

The foot trail eroded on the downstream slope is also a minor hazard at present. If the trail is not protected, more serious erosion is likely.

The seepage at the dam is of concern. Because of its localized nature and relatively high exit velocities, it indicates that there may be a potential for piping. It may also indicate a high water level (phreatic surface) in the embankment. This is discussed further in Paragraph 6.1b with the slopes and low areas of the embankment.

The eroded area behind the spillway training wall leaves the embankment slope steeper than at the remainder of the embankment.

(3) Appurtenant Structures. Plate E-2 indicates that the spillway walls are founded on rock. The cracks in the walls are probably shrinkage cracks that have been widened slightly by freeze-thaw action. At present, the cracks prevent the walls from acting as an impervious barrier during periods of high pools. The concrete patching at the lower part of the cracks and on the apron is satisfactory.

The stone masonry spillway training wall was placed to prevent further erosion of the embankment.

The amount of water leaking through the wall on the day of the inspection was almost sufficient to cause erosion. Because of the poor condition of the wall, larger spillway discharges would cause significantly more flow through the wall and, therefore, increase the erosion hazard. Other conditions at the spillway are assessed in Paragraph 6.1b.

The spalling at the endwall and intake structure of the outlet works is minor and of no concern at present. Other conditions at the outlet works are assessed in Paragraph 6.1.b.

b. Design and Construction Data. As noted in Appendix B, the top of the spillway walls are at different elevations at each side, the length of the weir crest is slightly shorter than its design length, the top of the embankment is low and it is significantly longer than its design length, the downstream slope is significantly steeper than its design value, the intake structure is tilting, and the spillway walls are slightly bowed. As noted in Section 5, the reservoir plan on Plate E-2 is inaccurate. These differences in design and actual values probably indicate that poor design survey data was obtained and that poor control on lines and grades was used during construction. Of primary concern are the steep downstream slope, the low areas on the top of the embankment and the tilting intake structure. The seepage and resulting possible high phreatic surface, when considered with the steep downstream slope, indicate that the stability of the structure may be marginal for the normal pool condition.

If the intake structure was constructed out-of-plumb, there would be no concern for its integrity. However, if the tilting is caused by differential settlement, there would be serious concern for the structure because Plate E-2 indicates it is founded on rock, which should allow for no settlement. The Owner confirmed that the cutoff wall is founded on rock. There would also be concern for the junction of the pipe and the intake structure.

There is no record of any stability analysis for the embankment. Because of its small size, the spillway weir is judged to be stable for all anticipated loading conditions.

c. Operating Records. There are no formal records of operation. According to available records, no

stability problems have occurred over the operational history of the dam.

d. Post-construction Changes. Post-construction changes are described in Paragraph 1.2g. The changes have been assessed with the dam.

e. Seismic Stability. Lake Jamie Dam is located in Seismic Zone 1. Earthquake loadings are not considered to be significant for small dams located in Seismic Zone 1 when there are no readily apparent stability problems. However, because of the steep downstream slope of the embankment and the observed seepage, it is questionable if the embankment could withstand an earthquake loading without a failure. If appropriate remedial measures are taken to insure adequate stability under normal operating conditions, then the ability of the embankment to withstand an earthquake would be assumed to be adequate.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, calculations, and past operational performance, Lake Jamie Dam is judged to be in fair condition. The recommended SDF for the size and hazard classification of the dam varies between the 1/2 PMF and the PMF. Based on the criteria and the downstream conditions, the selected SDF at the dam is the PMF. Based on existing conditions, the spillways will pass about 46 percent of the PMF before overtopping of the dam occurs. However, it is judged that the dam could just withstand the depth and duration of overtopping that would occur for the 1/2 PMF. If the low areas on the top of the embankment were filled to the design elevation, the spillways would pass about 77 percent of the PMF. For either condition, the spillway capacity is rated as inadequate, but not seriously inadequate.

(2) The steep downstream slope and the seepage at the dam indicate that the embankment stability may be marginal for the normal operating condition. The main spillway weir is judged to be stable.

(3) The ability of the emergency drawdown facility to function is uncertain.

(4) The dam has significant deviations from the design data.

(5) Maintenance at the dam needs to be improved.

(6) A summary of the features and observed deficiencies is listed below:

Feature and Location	Observed Deficiency
Embankment:	Low areas; brush, steep downstream slope; erosion on downstream slope.
Main Spillway:	Very deteriorated mortar at main spillway training wall; cracks in main spillway walls; debris in approach channel.
Outlet Works:	Uncertain operation of emergency drawdown facilities; tilting intake structure.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented immediately.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Perform studies to determine the factor of safety for the embankment and to determine the potential of the seepage to cause piping. Take appropriate action as necessary. In lieu of the above, constructing the downstream slope to its design value and providing a properly designed toe drain to control seepage would be acceptable.

(2) Perform additional studies to more accurately ascertain the spillway capacity required for Lake Jamie Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take appropriate action as required. In lieu of the

above, filling in the low areas along the top of the dam to bring the embankment to its design elevation would be acceptable.

(3) Repair the spillway training wall so that it acts as an impervioious barrier and repair the eroded area behind the wall.

(4) Perform studies to determine the cause of the tilting of the intake structure. Take appropriate action as necessary.

(5) Institute any necessary action to make the outlet works gate operational. Maintain and operate it on a regular basis.

(6) Repair the cracks in the spillway walls. Visually monitor the cracks. If the cracks enlarge or if other cracks appear, have the condition assessed by a professional engineer.

(7) As part of the regular maintenance program, complete cutting brush on the embankment, remove debris from the main spillway approach channel, and establish a grass cover on the eroded foot trail.

All studies and designs, as well as inspection of construction, should be performed by a professional engineer experienced in the design and construction of dams.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Lake Jamie Dam.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Lake Jamie Dam.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the dam is inspected frequently. As presently required by the Commonwealth, the program should include a formal annual inspection by a professional engineer experienced

in the design and construction of dams. Utilize the results to determine if remedial measures are necessary.

(5) Expand the existing maintenance program so that all features of the dam are properly maintained.

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: LAKE JAMIE

NDI ID NO.: PA-00778 DER ID NO.: 45-22

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	NONE DESIGN DRAWING ON PLATE E-2
REGIONAL VICINITY MAP	See PLATE E-1
CONSTRUCTION HISTORY	CONSTRUCTED 1956
TYPICAL SECTIONS OF DAM	See PLATE E-2
OUTLETS: Plan Details Constraints Discharge Ratings	SEE PLATE E-2

A-1

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE
DESIGN REPORTS	NONE
GEOLOGY REPORTS	NONE
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	NONE
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	NONE
POSTCONSTRUCTION SURVEYS OF DAM	NONE

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	NOT KNOWN
MONITORING SYSTEMS	NONE
MODIFICATIONS	SPILLWAY TRAINING WALL BUILT "A FEW" YEARS AFTER CONSTRUCTION.
HIGH POOL RECORDS	NONE
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	NONE
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	NONE

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	None
SPILLWAY: Plan Sections Details	See Plate E-2
OPERATING EQUIPMENT: Plans Details	See Plate E-2
PREVIOUS INSPECTIONS Dates Deficiencies	1966 - Spillway Approach is "Fair"; slight seepage at downstream toe.

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: LAKE JAMIE County: MONROE State: PENNSYLVANIA

NDI ID No.: PA-00778 DER ID No.: 45-220

Type of Dam: EARTHFILL Hazard Category: High

Date(s) Inspection: 14&15 APRIL 1980 Weather: CLEAR Temperature: 50-60°F

SOIL CONDITIONS: MOIST

Pool Elevation at Time of Inspection: 1865.1 msl/Tailwater at Time of Inspection: 1856.2 msl

Inspection Personnel:

J. BALLIET (OWNER) D. EBERSOLE (GFCC)

S. KUNTZ (FRIEND OF OWNER)

D. WILSON (GFCC)

A. WHITMAN (GFCC) Recorder

B-1

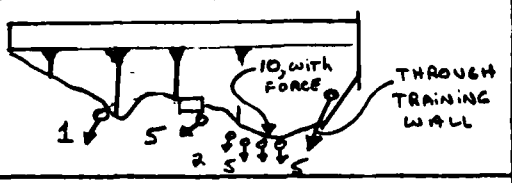
EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	FOOT TRAIL WITH BARE SOIL - NEGLIGIBLE EROSION JUST LEFT OF OUTLET WORKS. ALSO SEE "JUNCTION OF EMBANKMENT"	
CREST ALIGNMENT: Vertical Horizontal	HORIZONTAL - NO DEFICIENCIES VERTICAL - SEE SURVEY DATA FOLLOWING INSPECTION FORMS	
RIPRAP FAILURES	NONE	

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	JUNCTION SPILLWAY AND EMBANKMENT: SEVERE EROSION OF DOWNSTREAM SLOPE AT JUNCTION WITH TRAINING WALL.	
ANY NOTICEABLE SEEPAGE		ALL SEEPAGE IS CLEAR AND AT TOE: → INDICATES SEEPAGE POINT AND QUANTITY (gpm)
STAFF GAGE AND RECORDER	NONE	
DRAINS	NONE	
Vegetation	LOW, THICK BRUSH ON DOWNSTREAM SLOPE.	BEING CUT BY OWNER ON 15 APRIL.

B-2

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	CORRUGATED METAL PIPE CMP SCALING AND RUSTY	
INTAKE STRUCTURE	APPEARS TO TILT TOWARD DAM	MINOR SPALLING
OUTLET STRUCTURE	ENDWALL - NO DEFICIENCIES	MINOR SPALLING
OUTLET CHANNEL	NATURAL STREAM	
EMERGENCY GATE	OWNER STATED THAT IT HAD NOT BEEN OPERATED SINCE CONSTRUCTION AND WAS ALMOST CERTAINLY SILTED.	OPERATION DECLINED

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	GOOD CONDITION WALLS CRACKED EACH SIDE NEAR WEIR	PATCHING EVIDENT AT VARIOUS AREAS.
APPROACH CHANNEL	LOG ACROSS ENTIRE APPROACH CHANNEL - LOG FLOATING IN RESERVOIR	
DISCHARGE CHANNEL	DRY MASONRY TRAINING WALL LEAKS SEVERELY - MORTAR VERY DETERIORATED.	
BRIDGE AND PIERS	NONE	

Auxiliary ~~GATED~~ SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	NATURAL LOW AREA AT "UPSTREAM END" OF LAKE	
APPROACH CHANNEL	SEE SURVEY DATA FOLLOWING INSPECTION FORMS.	
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE AT SITE	
OBSERVATION WELLS		
WEIRS		
PIEZOMETERS		
OTHER	NONE AT SITE	

DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	CLEAR - REMAINS OF OLD DAM 200'+ DOWNSTREAM.	
SLOPES	STEEP	
APPROXIMATE NUMBER OF HOMES AND POPULATION	No dwellings LAKE-IN-The-CLOUDS DOWNSTREAM	

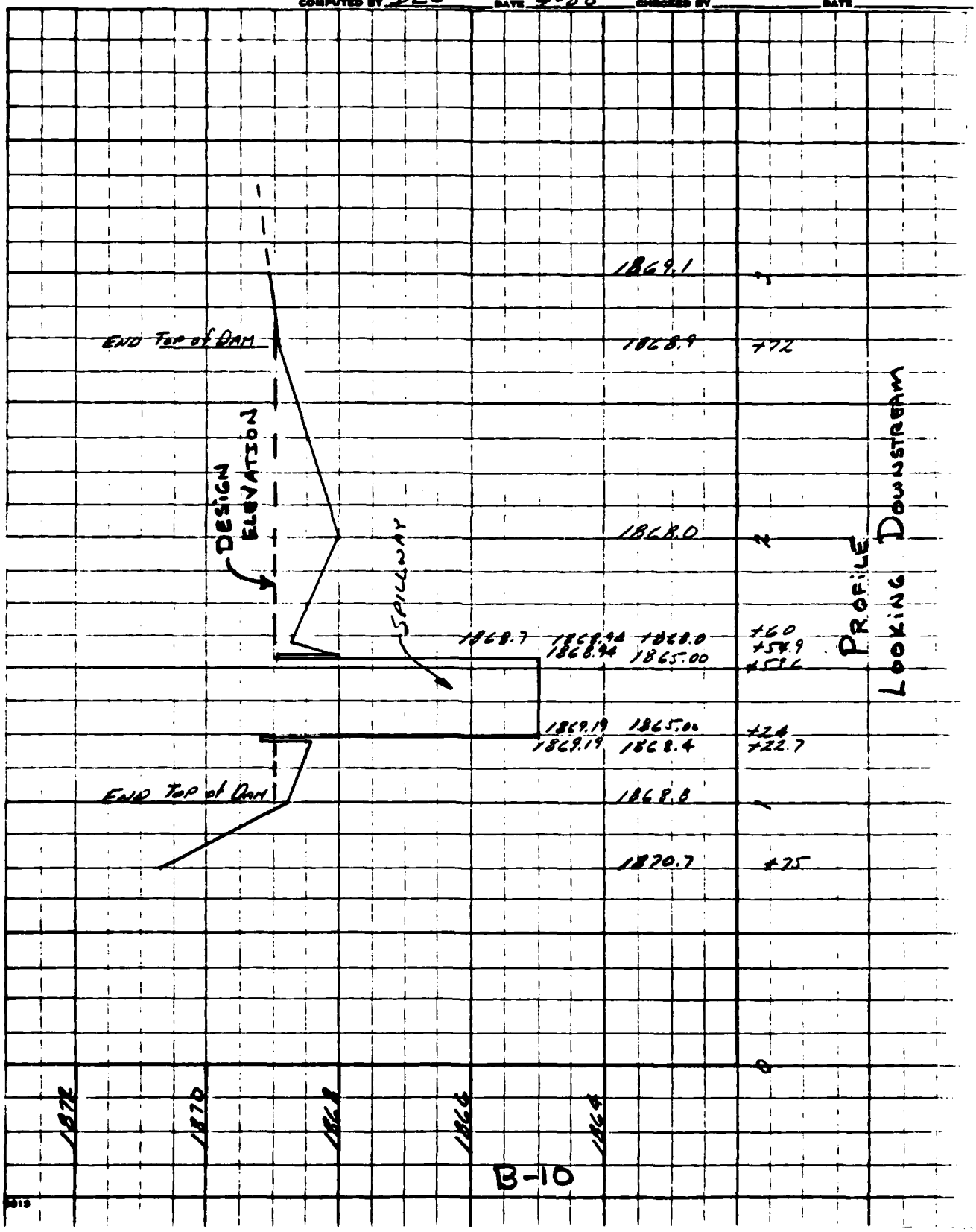
RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	VARY: MILD TO FAIRLY STEEP	
SEDIMENTATION	No Observed Problems	
WATERSHED DESCRIPTION	ALMOST ENTIRELY WOODED	

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

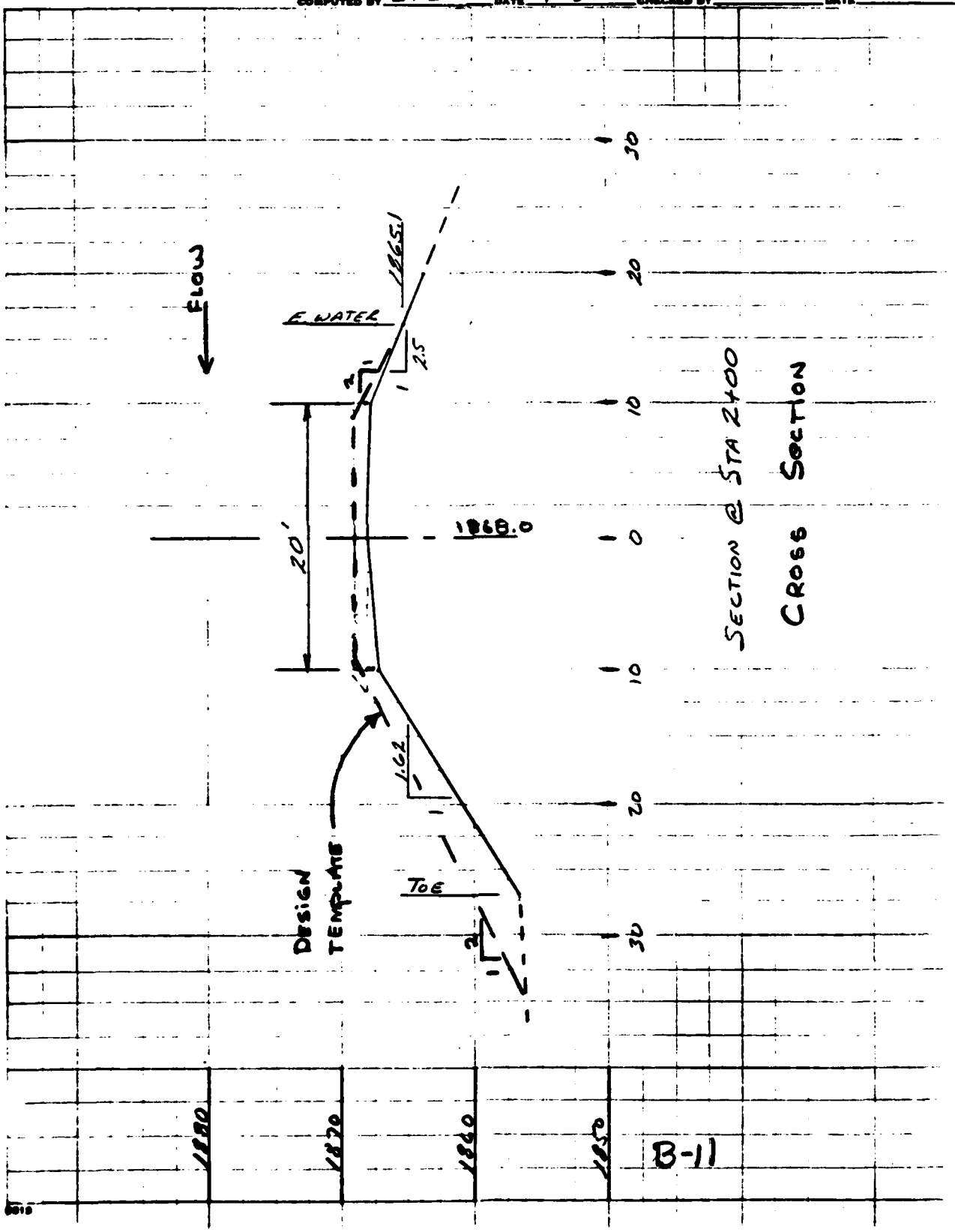
SUBJECT LAKE JAMIE DAM — FILE NO. 8202
PROFILE - TOP of DAM — SHEET NO. 1 OF ____ SHEETS
FOR
COMPUTED BY DLE — DATE 4-80 — CHECKED BY — DATE



B-10

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

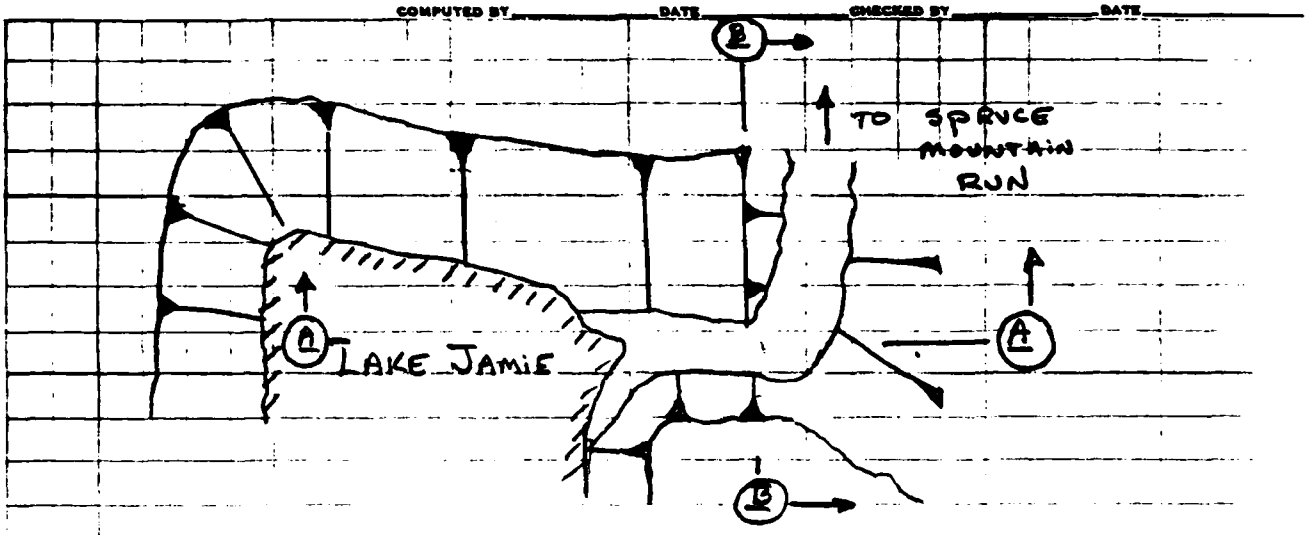
SUBJECT LAKE JAMIE DAM FILE NO. 8202
CROSS SECTION of EMBANKMENT SHEET NO. 2 OF ____ SHEETS
FOR
COMPUTED BY DLE DATE 4-80 CHECKED BY ____ DATE ____



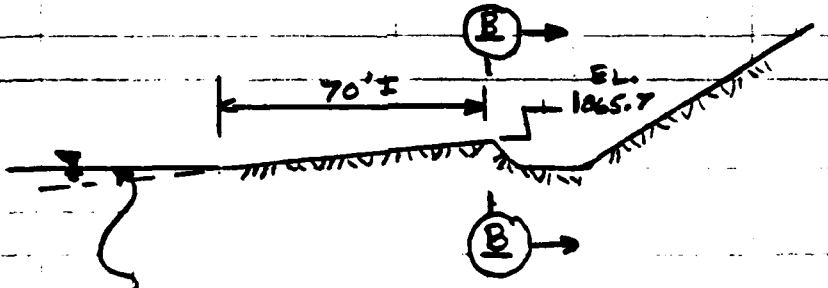
B-11

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

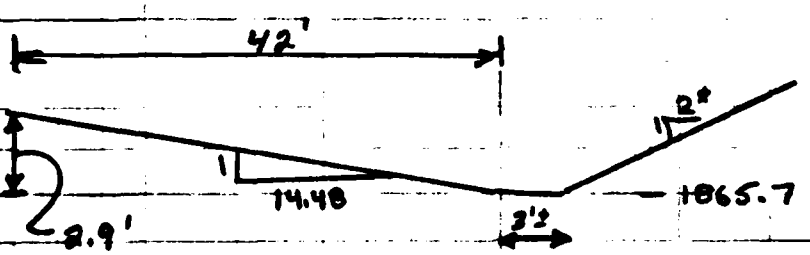
SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____



PLAN - NOT TO SCALE
NATURAL LOW AREA



SECTION (A) NOT TO SCALE

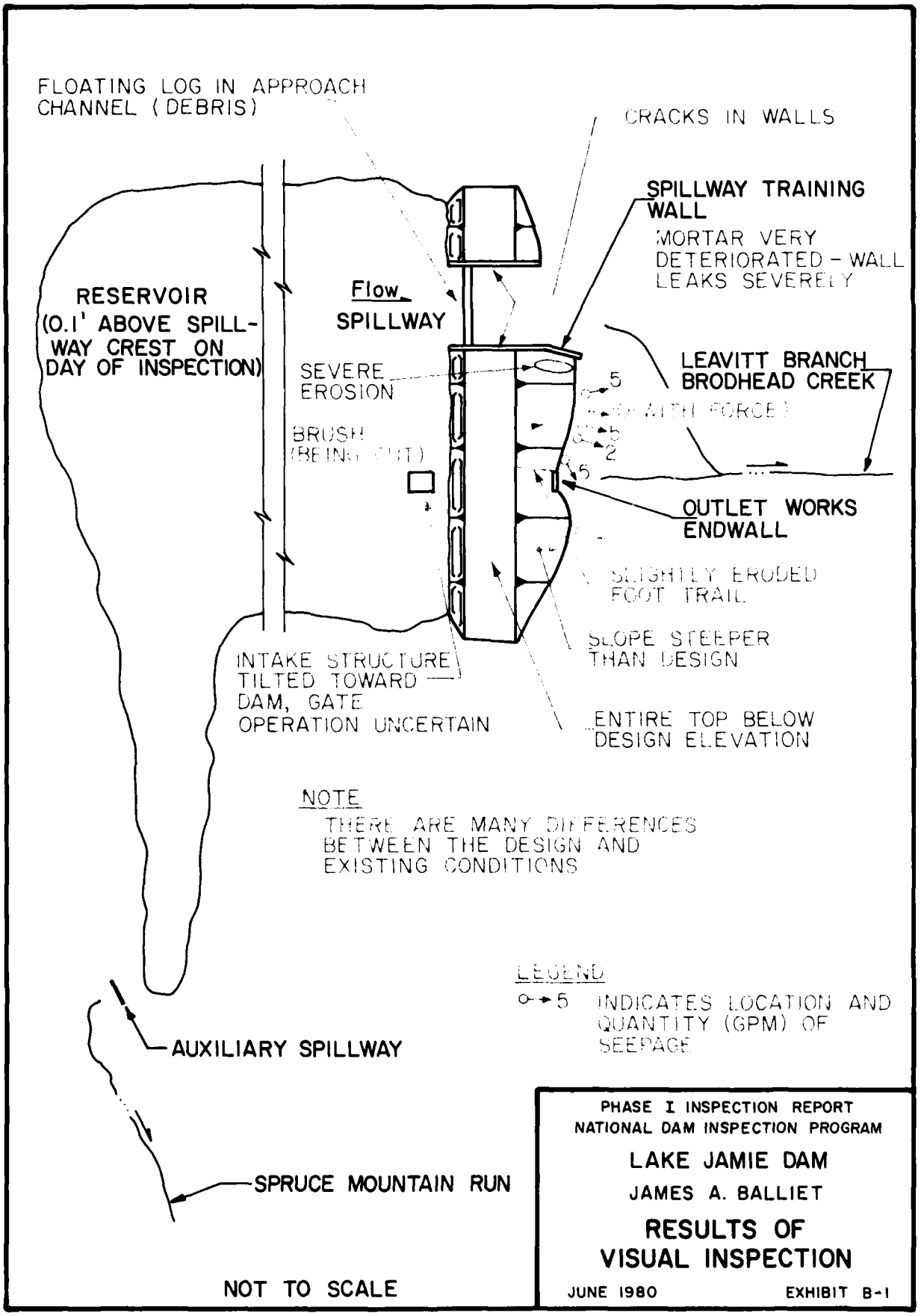


* ESTIMATED

SECTION (B) - NOT TO SCALE

AUXILIARY SPILLWAY

B-12



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM

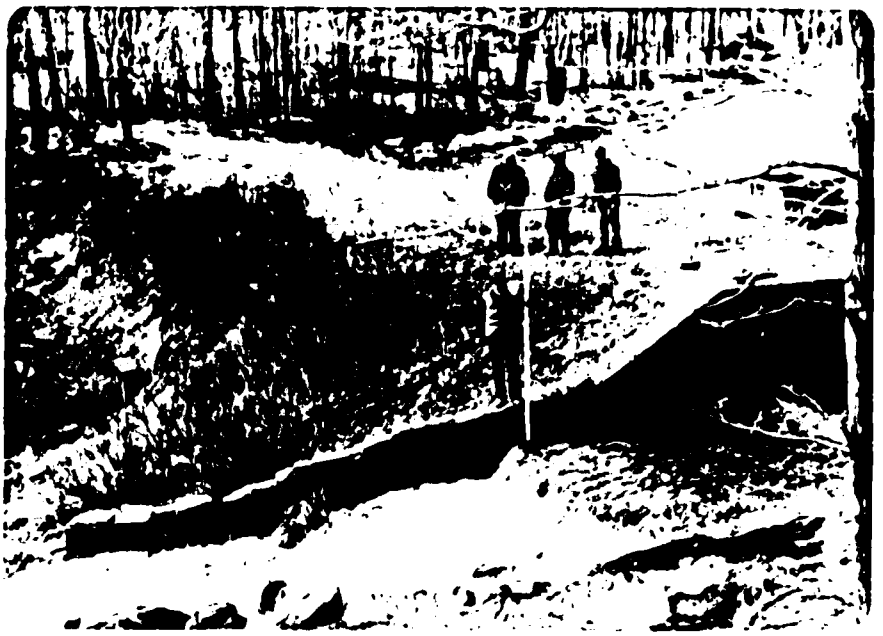
JAMES A. BALLIET

RESULTS OF VISUAL INSPECTION

JUNE 1980 EXHIBIT B-1

APPENDIX C

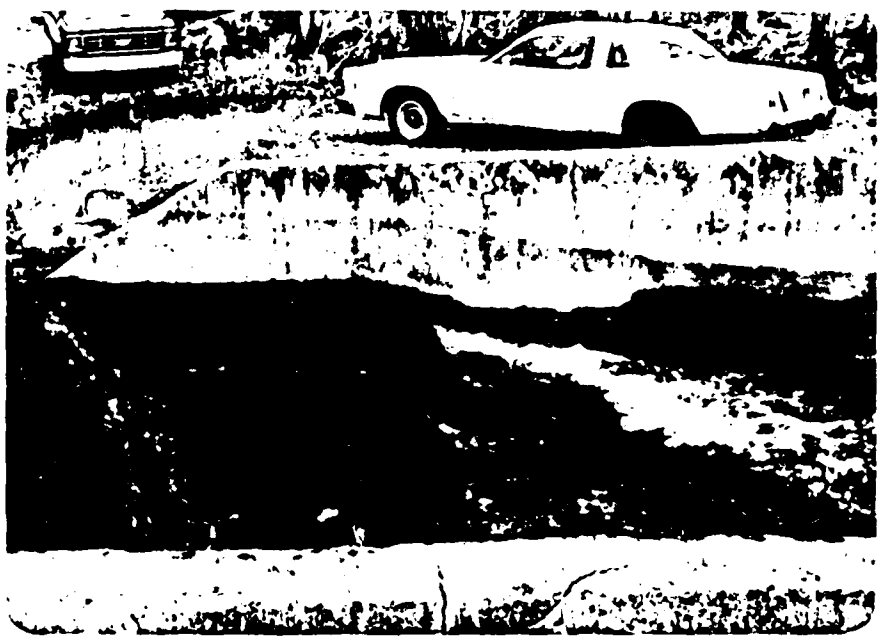
PHOTOGRAPHS



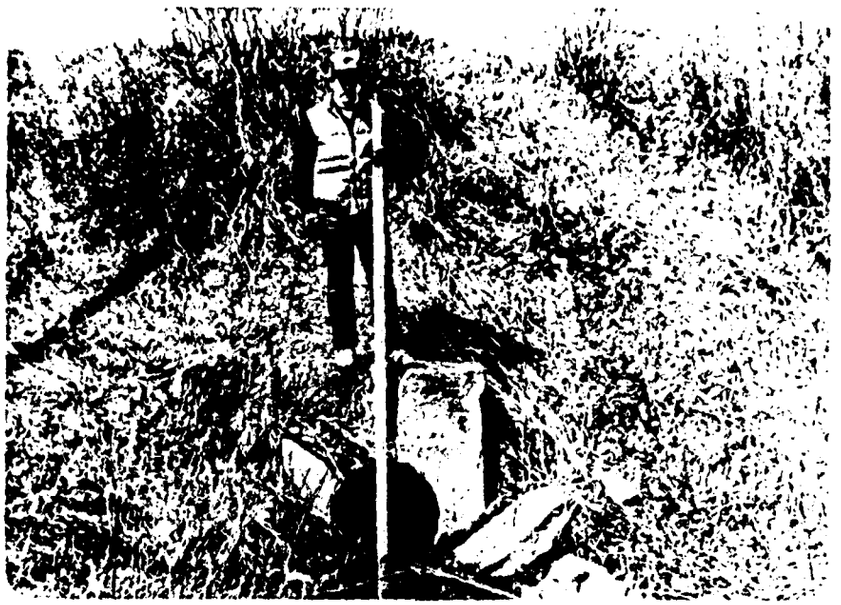
A. Downstream Slope

B. Upstream Slope

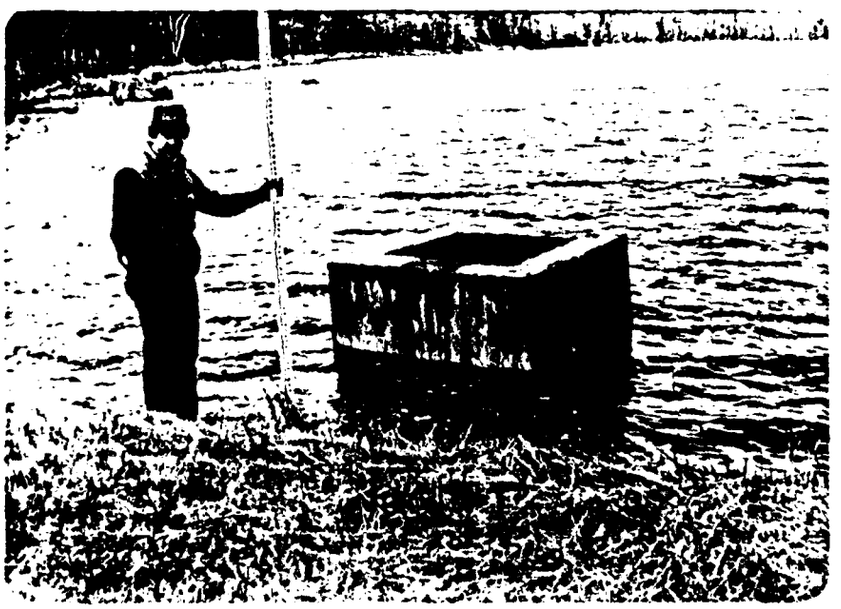
LAKE JAMIE DAM



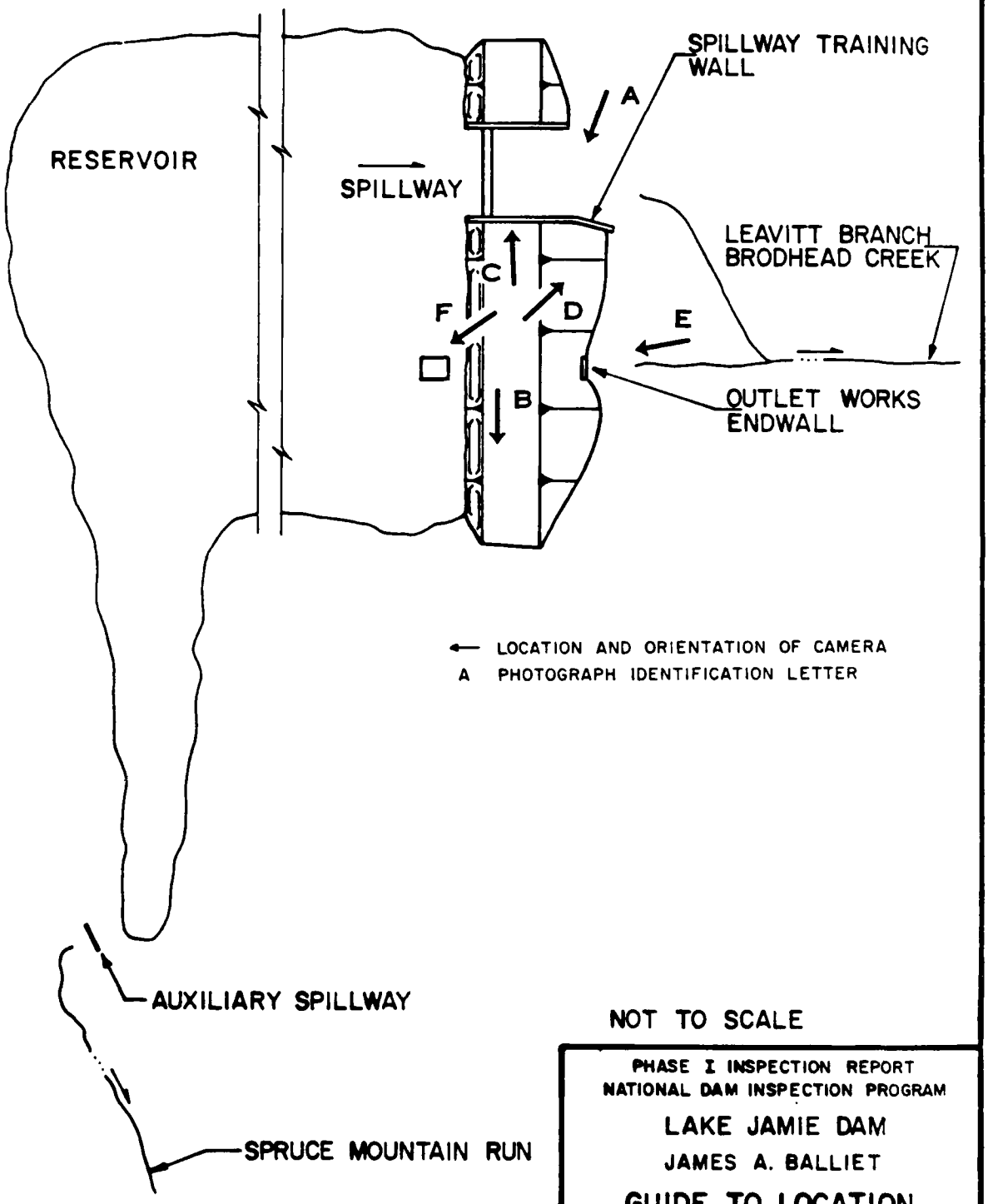
C. Spillway



E. Outlet Works Endwall



F. Outlet Works Intake Structure



NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM

JAMES A. BALLIET

GUIDE TO LOCATION OF PHOTOGRAPHS

JUNE 1980 EXHIBIT C-1

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D

HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

Description of Model:

If the Owner has not developed a PMF for the dam, the watershed is modeled with the HEC-1DB computer program, which was developed by the U.S. Army Corps of Engineers. The HEC-1DB computer program calculates a PMF runoff hydrograph (and percentages thereof) and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. By modifying the rainfall criteria, it is also possible to model the 100-year flood with the program.

APPENDIX D

DELAWARE River Basin
Name of Stream: LEAVITT BRANCH, BROADHEAD CREEK
Name of Dam: LAKE JAMIE
NDI ID No.: PA-00778
DER ID No.: 45-220
Latitude: N 41°14' 35" Longitude: W 75°16' 05"
Top of Dam Elevation: 1868.0 (EXISTING)
Streambed Elevation: 1856.2 Height of Dam: 12 ft
Reservoir Storage at Top of Dam Elevation: 276 acre-ft
Size Category: SMALL
Hazard Category: HIGH (see Section 5)
Spillway Design Flood: VARIES ½ PMF TO PMF
SELECT PMF BASED ON SDF FOR LAKE-IN-THE-CLOUDS DOWNSTREAM.

UPSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
NONE				

DOWNSTREAM DAMS

LAKE-IN-THE-CLOUDS	0.7	14	468 (1)	NDI PA-00741 DER 52-125
SKYTOP	2.8	19	1,021 (2)	NDI PA-00634 DER 45-71
SCS PA-463	3.5	88±	1,100 (3)	SCS DESIGN DATA

(1) PHASE I REPORT BEING PREPARED CONCURRENTLY
(2) PHASE I REPORT PREVIOUSLY PREPARED.
(3) ALSO TWO SMALL DAMS NOT CONSIDERED PERTINENT TO THE ANALYSIS.

DELAWARE River Basin

Name of Stream: LEAVITT BRANCH, BRODHEAD CREEK

Name of Dam: LAKE JAMIE

DETERMINATION OF PMF RAINFALL & UNIT HYDROGRAPH

UNIT HYDROGRAPH DATA:

Sub-area	Drainage Area (square miles)	Cp (1)	Ct (2)	L miles (3)	L_{ca} miles (4)	L' miles (5)	Tp hours (6)	Map Area (7)	Plate (8)
J-1	0.79	0.46	1.23	1.53	.76	N/A	1.29	1	A
Total	0.79								

(See Sketch on Sheet D-4)

(1) & (2): Snyder Unit Hydrograph coefficients supplied by Baltimore District, Corps of Engineers on maps and plates referenced in (7) & (8)

The following are measured from the outlet of the subarea:

(3): Length of main watercourse extended to divide

(4): Length of main watercourse to the centroid

The following is measured from the upstream end of the reservoir at normal pool:

(5): Length of main watercourse extended to divide

(6): $Tp=C_t \times (L \times L_{ca})^{0.3}$, except where the centroid of the subarea is located in the reservoir. Then $Tp=C_t \times (L')^{0.6}$

Initial flow is assumed at 1.5 cfs/sq. mile

Computer Data: QRCSN = -0.05 (5% of peak flow)
RTIOR = 2.0

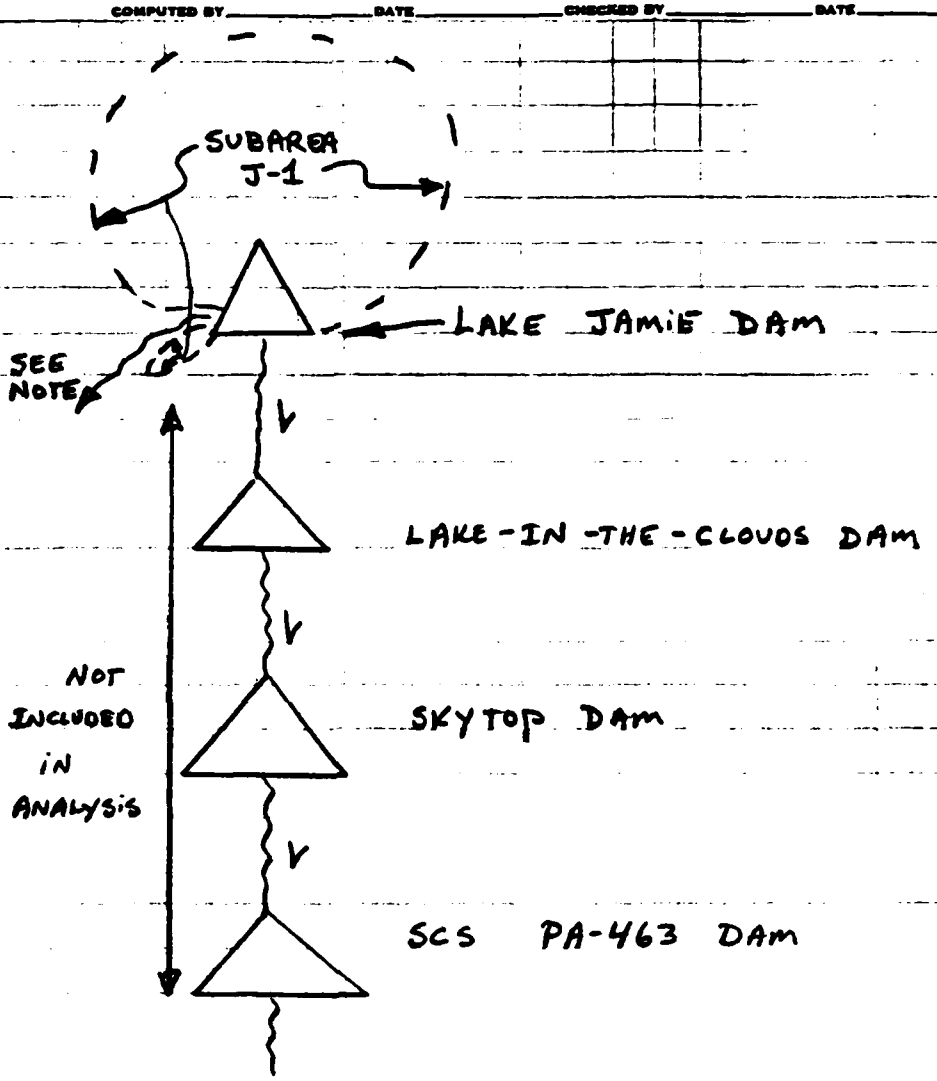
RAINFALL DATA:

PMF Rainfall Index= 22.1 in., 24 hr., 200 sq. mile

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone:	N/A	1
Geographic Adjustment Factor:	N/A	1.0
Revised Index Rainfall:	N/A	22.1

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	111
12 hours	123
24 hours	133
48 hours	142
72 hours	
96 hours	



NOTE: THE "AUXILIARY SPILLWAY" AT LAKE JAMIE DAM DISCHARGES INTO SPRUCE MOUNTAIN RUN.

SKETCH OF SYSTEM

Data for Dam at Outlet of Subarea J-1 (See sketch on Sheet D-4)

Name of Dam: LAKE JAMIE

STORAGE DATA:

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1836.1 =ELEVO*	0	0	0	NO DESIGN DATA, ELEVO = STREAMBED AT TOE
1865.0 =ELEV1	44 =A1		131 =S1	
1868.0	52		276	EXISTING TOP
1869.0	55		330	DESIGN TOP
1880.0 **	94			

* ~~ELEVO - ELEV1 = (3S1/A1)~~ $S_1 = (ELEV1 - ELEVO) \times A1/3$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 9 percent of subarea watershed.

BREACH DATA: NOT USED

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: _____

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) _____ fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = _____ ft., C = ____ Top of Dam El.= ____

HMAX + Top of Dam El. = _____ = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = _____ ft (width of bottom of breach)
Z = _____ (side slopes of breach)
ELBM = _____ (bottom of breach elevation, minimum of zero storage elevation)
WSEL = _____ (normal pool elevation)
T FAIL= _____ mins = _____ hrs (time for breach to develop)

Data for Dam at Outlet of Subarea J-1

Name of Dam: LAKE JAMIE

SPILLWAY DATA:	Existing Conditions	Design Conditions
Top of Dam Elevation	1868.0	1869.0
Spillway Crest Elevation	1865.0	1865.0
Spillway Head Available (ft)	3.0	4.0
Type Spillway	ROUNDED CREST	
"C" Value - Spillway	3.4	3.4
Crest Length - Spillway (ft)	29.6	30.0
Spillway Peak Discharge (cfs)		
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		~ SEE NEXT SHEET
"C" Value - Auxiliary Spill. (ft)		
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)		

Spillway Rating Curve: SEE NEXT SHEET

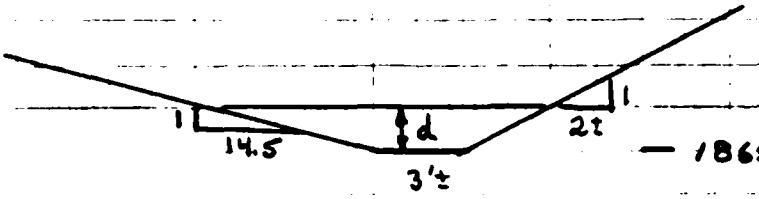
Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
1865.0			0
1865.7			61
1866.3			159
1866.9			300
1867.5			487
1868.1			722
1869.2			1,351
1870.4			2,207
1871.5			3,312

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet	1856.2		
Invert of Inlet	1857.0		
Type	CMP		
Diameter (ft) = D	2		
Length (ft) = L	55		
Area (sq. ft) = A	3.14		
N	.024		
K Entrance	0.5		
K Exit	1.0		
K Friction=$29.1 N^2 L/R^{4/3}$	2.3		
Sum of K	3.8		
$(1/K)^{0.5} = C$	0.51		
Maximum Head (ft) = HM	11		
$Q = CA\sqrt{2g(HM)}$ (cfs)	42.6		
Q Combined (cfs) ≈	40		

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. _____ OF _____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

LAKE JAMIE
AUXILIARY SPILLWAY
NATURAL OUTLET



FROM FIELD SURVEY FOR LAKE JAMIE DAM PHASE I INSPECTION

USE DISCHARGE COEFFICIENT OF 2.5 BECAUSE OF IRREGULAR APPROACH CONDITIONS

$Q = \frac{2.5}{3.1}\sqrt{\frac{A^3 g}{T}}$ MODIFIED CRITICAL DEPTH

d = depth

A = AREA (FT²) T = TOPWIDTH (FT) Q = FLOW (CFS)

V (VELOCITY - FPS) = Q/A

POOL = $1865.7 + d + V^2/2g$ $g = 32.18$

$A = d\left(3 + \frac{(14.5+2)}{2} d\right)$ $T = 3 + 16.5d$

ΣQ = Q + MAIN SPILLWAY DISCHARGE

d	A	T	Q	hv	POOL	ΣQ
0	0	3	0	0	1865.7	61
0.5	3.56	11.25	96	.1	1866.3	159
1.0	11.25	19.5	39	.2	1866.9	300
1.5	23.06	27.75	96	.3	1867.5	487
2.0	39.0	36.0	186	.4	1868.1	722
2.5	59.1	44.3	312	.4	1868.6	1009
3.0	83.3	52.5	480	.5	1869.2	1,351
3.5	111.6	60.8	692	.6	1869.8	1,749
4.0	144	69	952	.7	1870.4	2,207
5.0	221.3	85.5	1,628	.8	1871.5	3,312
15.0	1901.3	250.5	23,962	2.5	1883.2	31,756

$Q_{main\ spillway} = 29.6 \times 3.4 \times (POOL - 1865)^{1.5}$

5019

Selected Computer Output

D

EXISTING

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********************************
    1                 A1                        NATIONAL DAM INSPECTION PROGRAM
    2                 A2                     LEAVITT BRANCH,BRODHEAD CREEK
    3                 A3                           LAKE JAMIE DAM
    4                 B     220         0        15         0         0         0         0         0        -4         0
    5                 B1      5
    6                 J       1         6         1
    7                 J1    1.0        .7        .6        .5        .4        .3
    8                 K       0         1                                      1
    9                 K1          INFLOW TO LAKE JAMIE DAM
   10                 M       1         1       .79                 .79                             1
   11                 P                22.1       111       123       133       142
   12                 T                                                        1       .05                 .09
   13                 W     1.29      0.45
   14                 X     -1.5     -0.05       2.0
   15                 K       1         1                                      1
   16                 K1          ROUTE THROUGH LAKE JAMIE DAM
   17                 Y                                    1
   18                 Y1      1                                              -1865      -1
   19                 Y4   1865      1865.7    1866.3    1866.9    1867.5    1868.1    1869.2    1870.4    1871.5
   20                 Y5      0         61       159       300       487       722      1351      2207      3312
   21                 SA      0         44        94
   22                 SE 1856.1      1865      1880
   23                 SS   1865
   24                 SD   1868
   25                 SL      1         63       120       140       190
   26                 SV   1868      1868.4    1868.7    1868.9      1870
   27                 K      99
```

D-9

D

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .70	RATIO 3 .60	RATIO 4 .50	RATIO 5 .40	RATIO 6 .30
HYDROGRAPH AT	1	.79	1	2004.	1403.	1203.	1002.	802.	601.
	(	2.05)	(	56.75)(	39.73)(	34.05)(	28.38)(	22.70)(	17.03)(
ROUTED TO	1	.79	1	1799.	1168.	959.	751.	577.	408.
	(	2.05)	(	50.95)(	33.07)(	27.15)(	21.28)(	16.33)(	11.56)(

D-10

D

SUMMARY OF DAM SAFETY ANALYSIS

LAKE JAMIE DAM

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1865.00	1865.00	1868.00
STORAGE	131.	131.	275.
OUTFLOW	0.	0.	683.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1869.31	1.31	346.	1799.	5.50	41.75	0.00
.70	1868.73	.73	314.	1168.	4.25	42.25	0.00
.60	1868.47	.47	300.	959.	3.25	42.50	0.00
.50	1868.15	.15	283.	751.	1.75	42.75	0.00
.40	1867.73	0.00	261.	577.	0.00	42.75	0.00
.30	1867.25	0.00	236.	408.	0.00	43.00	0.00

D-11

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

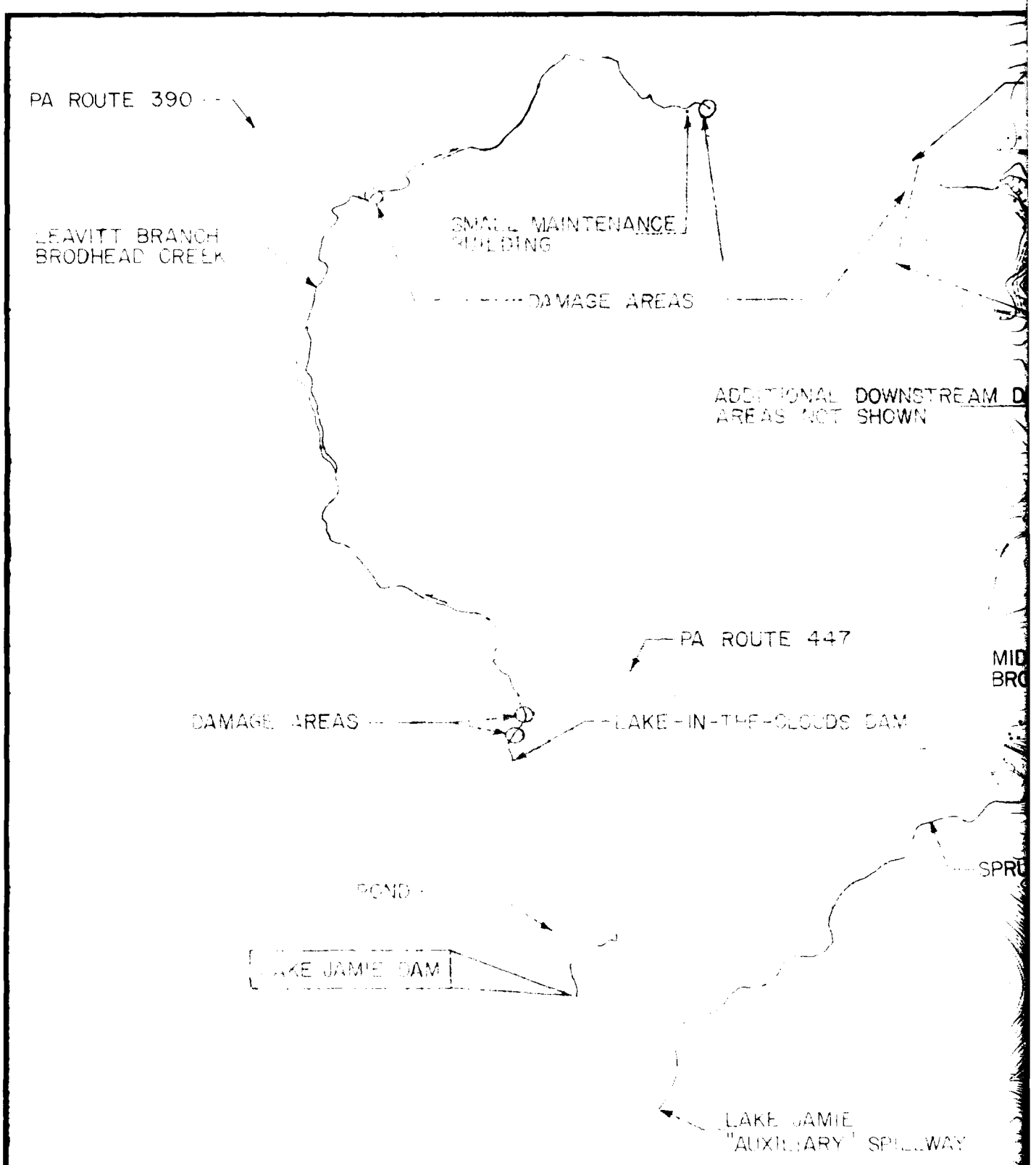
SUBJECT _____ FILE NO. _____
SHEET NO. _____ OF _____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

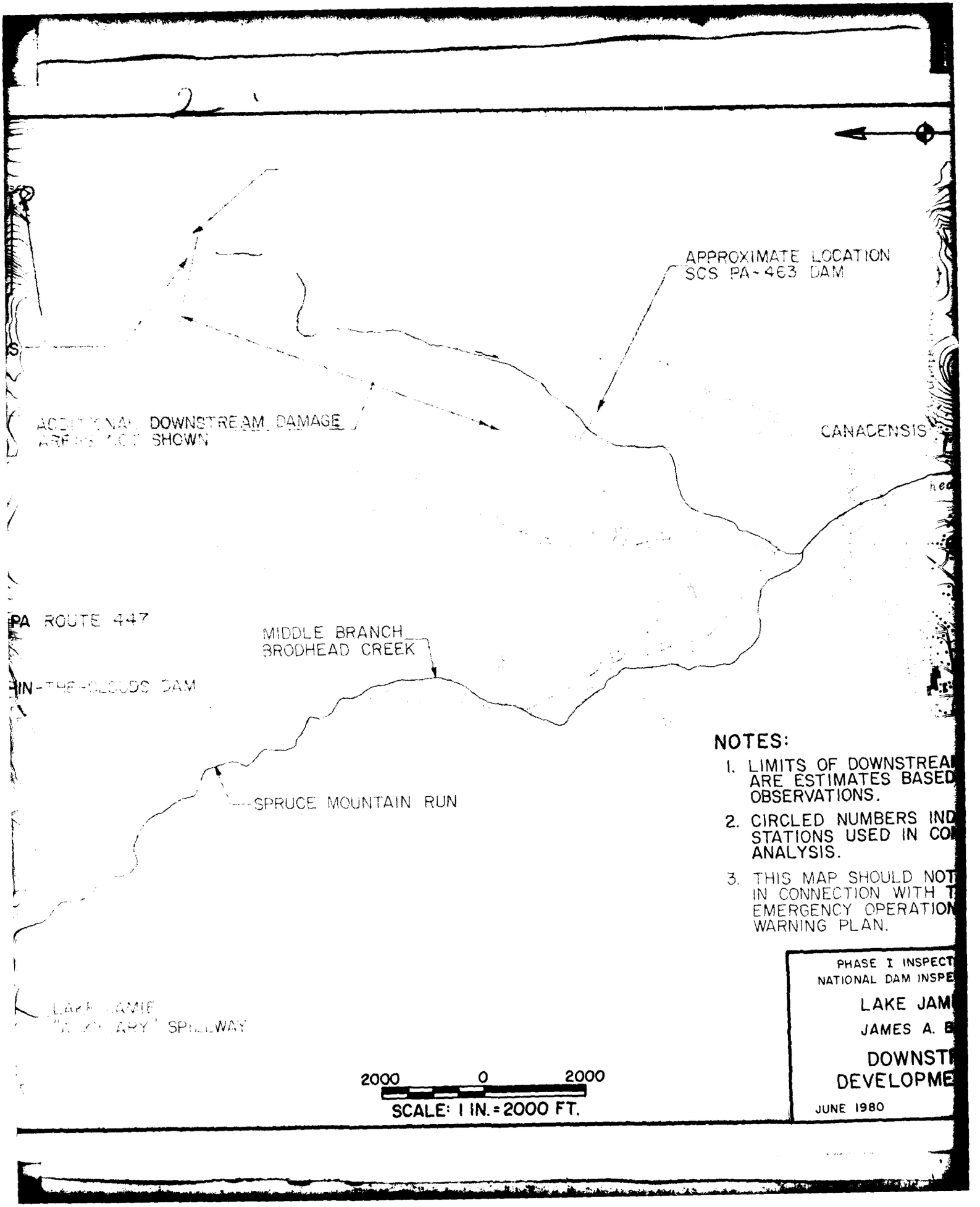
Summary of Pertinent Data

PMF RAINFALL = 25.11"

	PMF	0.5 PMF
RUNOFF (INCHES)	22.93	11.47
LAKE JAMIE DAM:		
PEAK INFLOW (CFS)	2,004	1,002
PEAK OUTFLOW (CFS)	1,799	751
DEPTH OF OVERTOPPING (FT)	1.31	.15
DURATION OF OVERTOPPING (HRS)	5.5	1.75

5818


PA ROUTE 390
LEAVITT BRANCH
BRODHEAD CREEK
SMALL MAINTENANCE
BUILDING
DAMAGE AREAS
ADDITIONAL DOWNSTREAM D
AREAS NOT SHOWN
PA ROUTE 447
DAMAGE AREAS
LAKE-IN-THE-CLOUDS DAM
POND
LAKE JAMIE DAM
LAKE JAMIE
"AUXILIARY" SPILLWAY



NOTES:

1. LIMITS OF DOWNSTREAM ARE ESTIMATES BASED OBSERVATIONS.
2. CIRCLED NUMBERS IND STATIONS USED IN CO ANALYSIS.
3. THIS MAP SHOULD NOT IN CONNECTION WITH T EMERGENCY OPERATION WARNING PLAN.

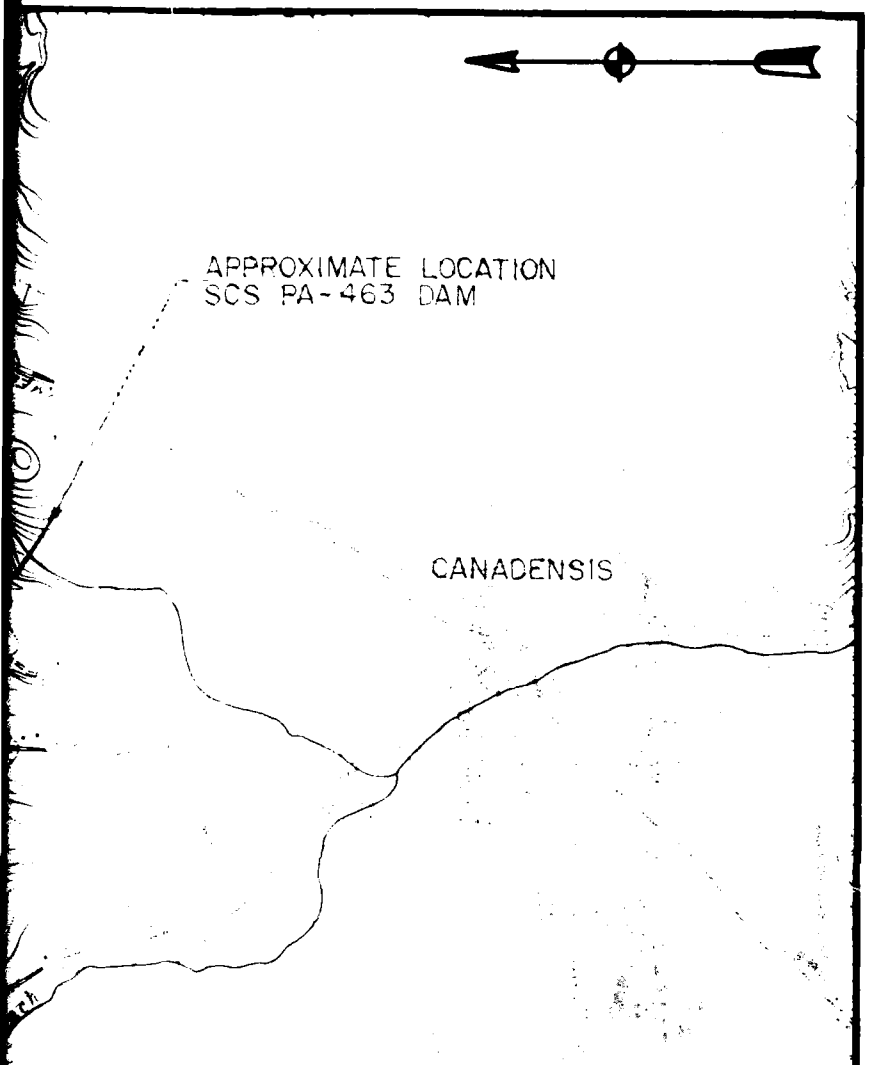
PHASE I INSPECT
NATIONAL DAM INSPE

LAKE JAM

JAMES A. B

DOWNSTR
DEVELOPME

JUNE 1980



NOTES:

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS.
2. CIRCLED NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.
3. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM

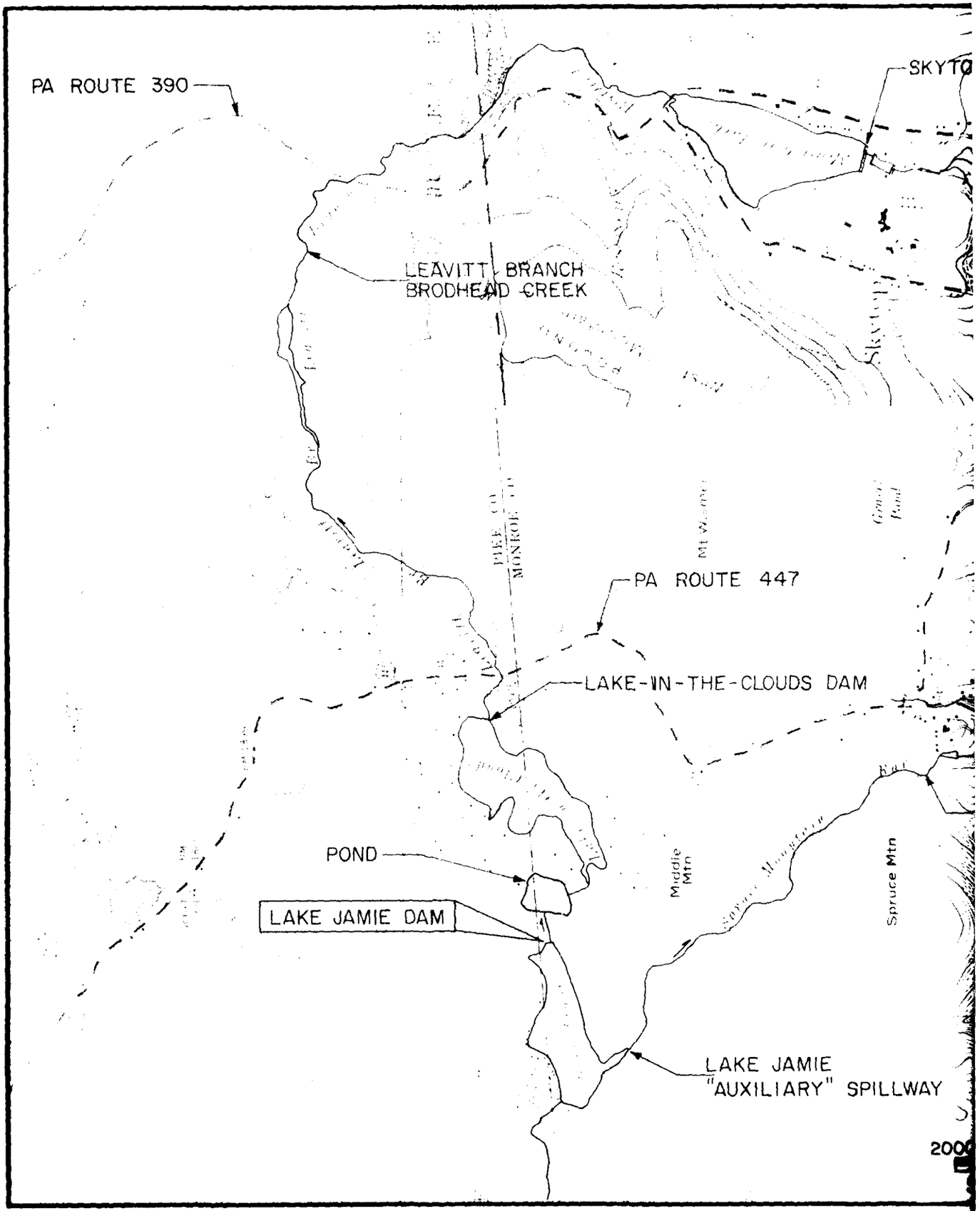
JAMES A. BALLIET

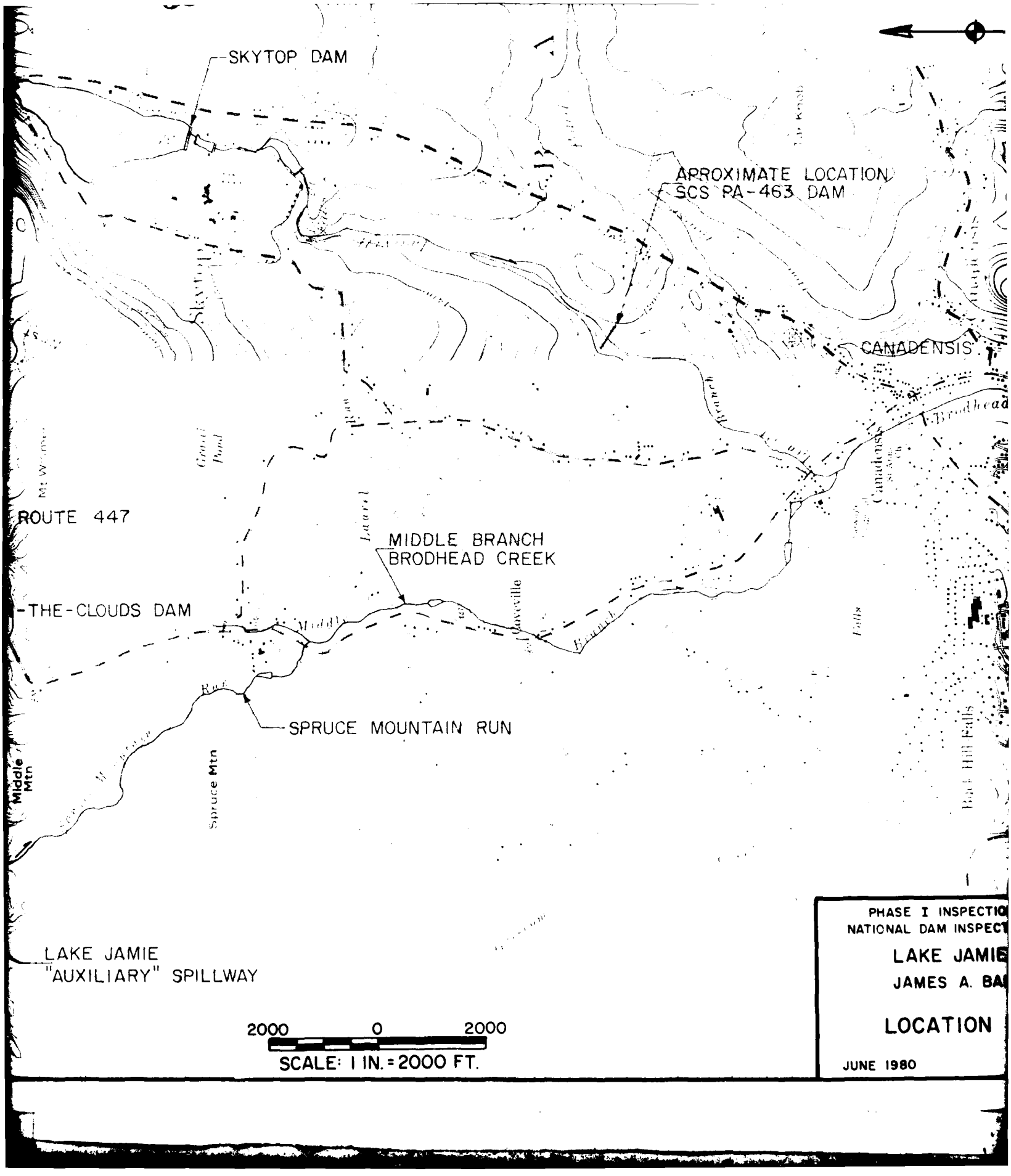
DOWNSTREAM DEVELOPMENT MAP

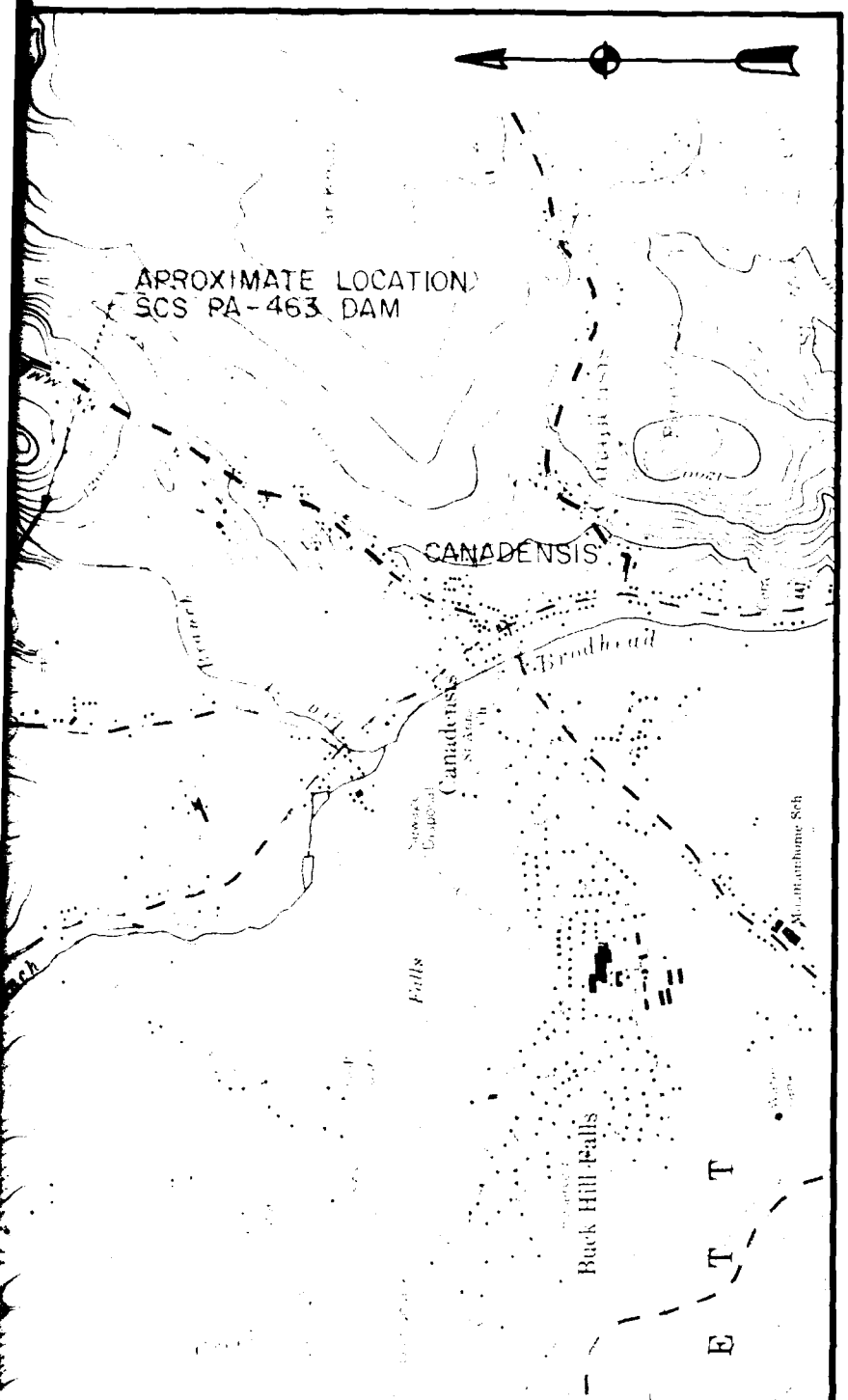
JUNE 1980 EXHIBIT D-1

APPENDIX E

PLATES


PA ROUTE 390
SKYTO
LEAVITT BRANCH
BRODHEAD CREEK
PIKE CO
MONROE CO
PA ROUTE 447
LAKE-IN-THE-CLOUDS DAM
POND
LAKE JAMIE DAM
Middle Mtn
Spruce Mtn
LAKE JAMIE
"AUXILIARY" SPILLWAY


SKYTOP DAM
APROXIMATE LOCATION
SCS PA-463 DAM
CANADENSIS
ROUTE 447
MIDDLE BRANCH
BRODHEAD CREEK
THE-CLOUDS DAM
SPRUCE MOUNTAIN RUN
LAKE JAMIE
"AUXILIARY" SPILLWAY
Middle Mtn
Spruce Mtn
2000 0 2000
SCALE: 1 IN. = 2000 FT.
PHASE I INSPECTIO
NATIONAL DAM INSPECT
LAKE JAMIE
JAMES A. BA
LOCATION
JUNE 1980



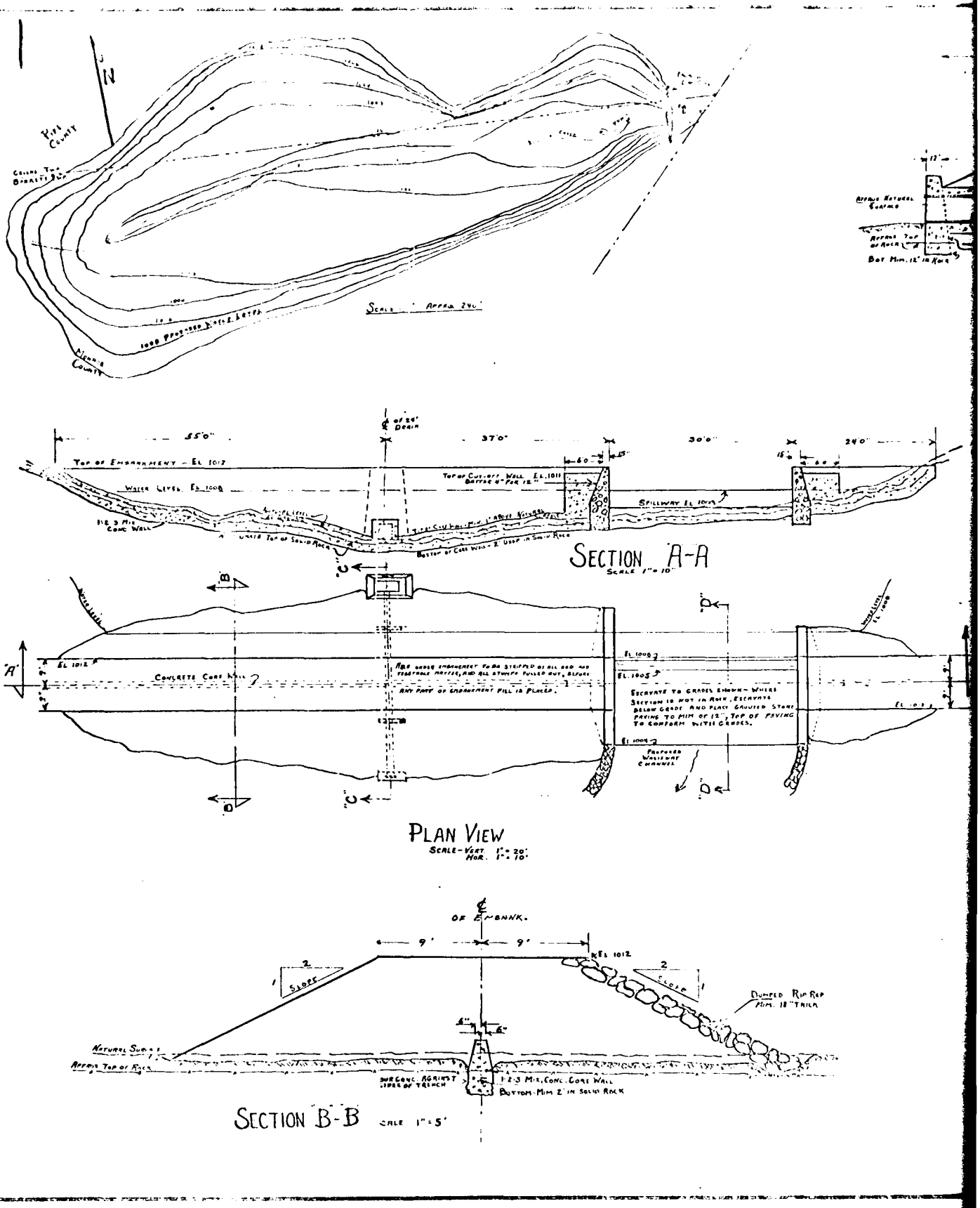
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM

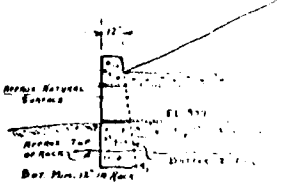
JAMES A. BALLIET

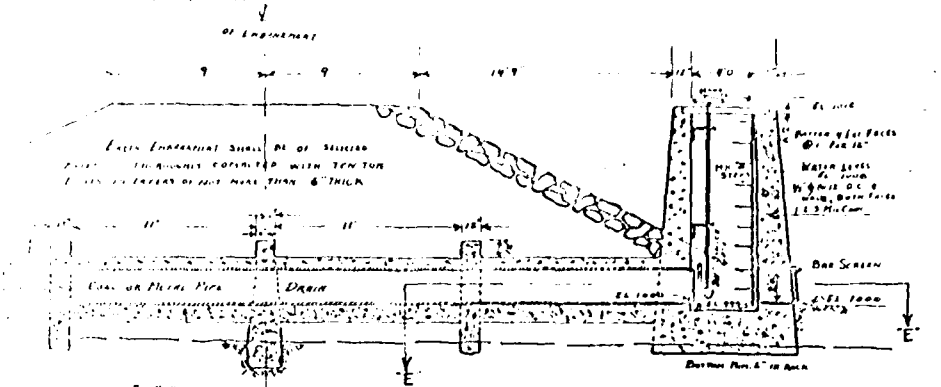
LOCATION MAP

JUNE 1980 PLATE E-1

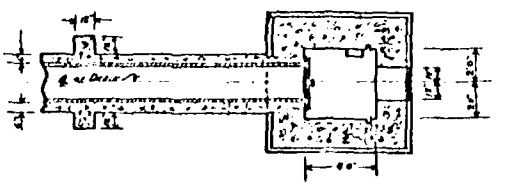

N
Pike County
Scale - Approx 2"=1 Mile
Section A-A
Scale 1"=10'
Top of Embankment - El 1012
Water Level El 1008
Spillway El 1004
Top of Cut-off Wall El 1011
Bottom of Core Wall 2' Deep in Solid Rock
Concrete Core Wall
Plan View
Scale - Vert 1"=20'
Hor. 1"=10'
Slope
Natural Surface
Approx Top of Rock
Dumped Rip Rap
Min. 18" Thick
Bottom Min 2' in Solid Rock
Section B-B
Scale 1"=5'

2

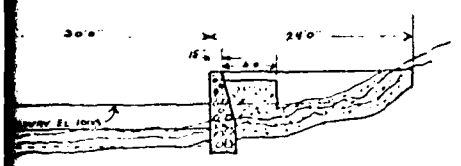




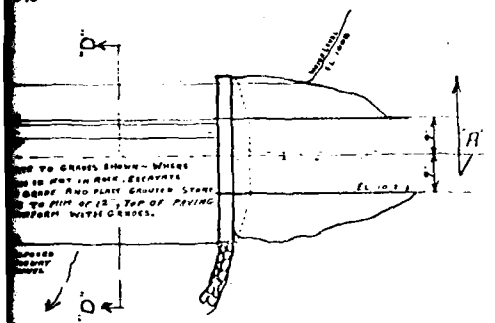
SECTION C-C SCALE 1"=5'

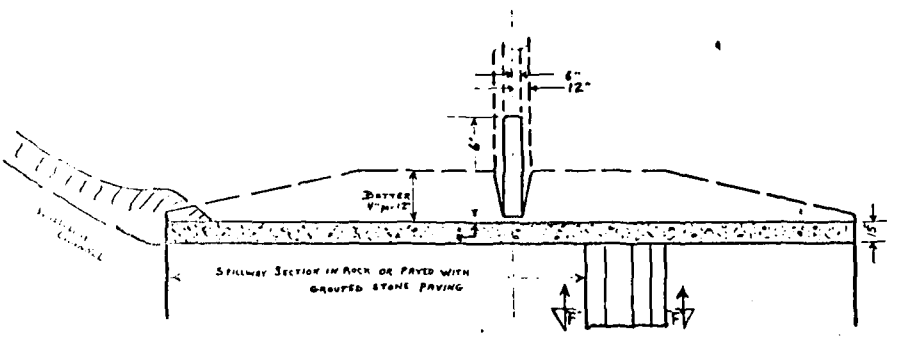


SECTION E-E SCALE 1"=5'

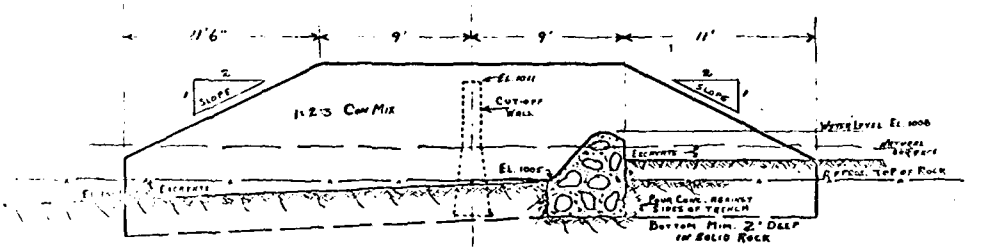


A-A

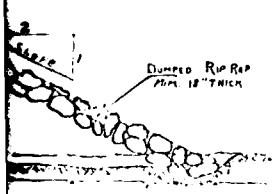


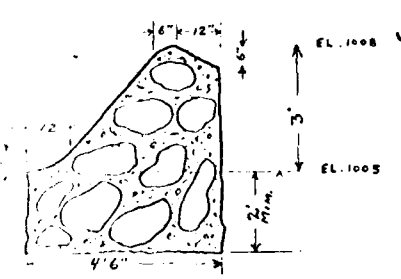


PART PLAN OF SPILLWAY SECTION
SCALE - 1"=5'



SECTION D-D SCALE 1"=5'



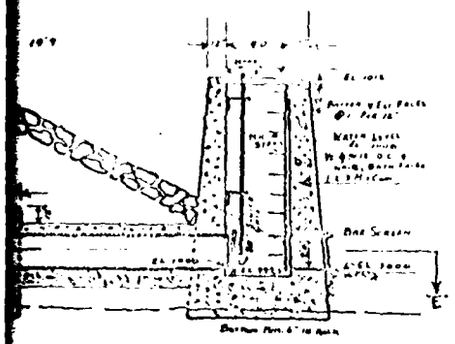


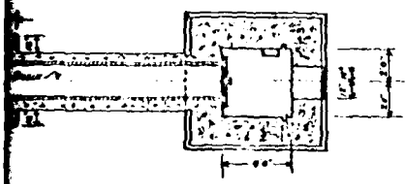
SECTION F-F SCALE 1"=2'

PLANS AND SECTIONS
OF PROPOSED DAM ON
JAMES A. BALLIET PROPERTY
LOCATED IN GREENE TWP, PIKE CO. AND BARRETT TWP., MONROE CO., PA.

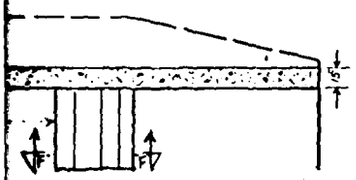
DATE - APRIL 28, 1954
SCALE - AS SHOWN
DRAWN BY - WM H FEDRICK

3

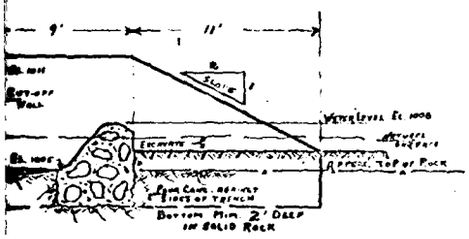




SECTION E-E SCALE 1"=5'



WAY SECTION



N D-D SCALE 1"=5'

PLANS AND SECTIONS
OF PROPOSED DAM ON
JAMES A. BALLIET PROPERTY
LOCATED IN GREENE TWP, PIKE CO AND BARRETT TWP., MONROE CO, PA.

DATE - APRIL 28, 1959
SCALE - AS SHOWN
DRAWN BY - WM H FLORICH

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM
JAMES A. BALLIET

PLAN, PROFILE
AND SECTIONS

JUNE 1980 PLATE E-2

APPENDIX F

GEOLOGY

LAKE JAMIE DAM

APPENDIX F

GEOLOGY

Lake Jamie Dam is located in Monroe County within the Appalachian Plateau Physiographic Province. The most pronounced topographic feature in the area is Camelback Mountain, which is part of the Pocono Plateau Escarpment. The escarpment has a well-defined southwestward trend from Camelback Mountain, but is irregular between Camelback Mountain and Mt. Pocono, which lies to the north. Streams east of the escarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the escarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by pre-glacial erosional topography with locally-thick glacial deposits. Local relief is generally 100 to 300 feet.

Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing member; sandstone, siltstone and shale of the Walcksville Member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

Lake Jamie Dam is underlain by the Poplar Gap Member of the Catskill Formation. The Poplar Gap Member is predominantly a gray sandstone and conglomeratic sandstone

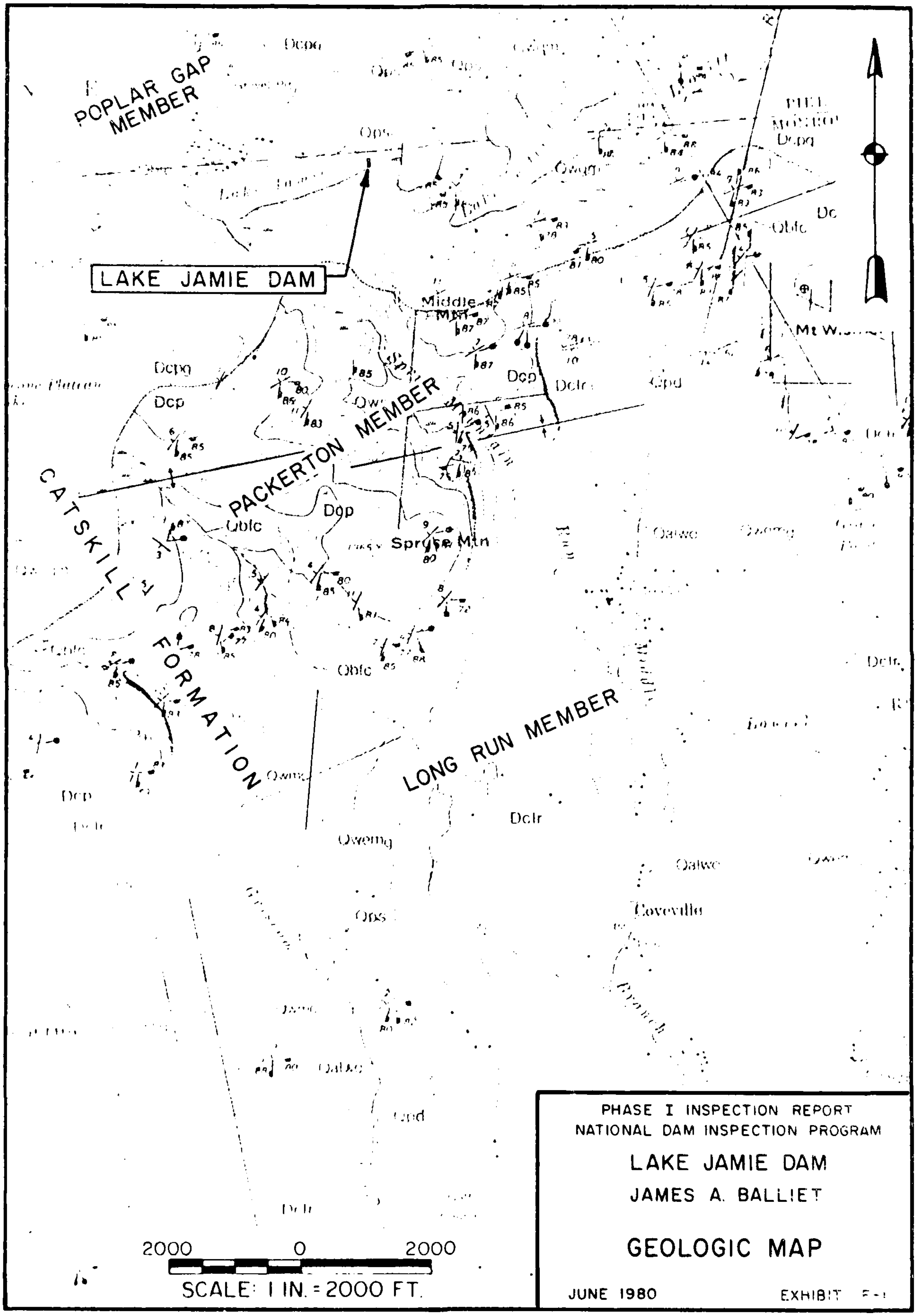
with interbedded siltstones and shales. Sandstones present are thick-bedded, fine- to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes.

Conglomeratic sandstone occurs primarily as concentrates of sub-round to round quartz pebbles. The siltstones and shales at the site are thin-bedded and also have low porosity.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is generally derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet.

The available information indicates that the spillway, cutoff wall and outlet works intake structure are founded on bedrock.



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE JAMIE DAM

JAMES A. BALLIET

GEOLOGIC MAP

JUNE 1980 EXHIBIT F-1